CHEMICAL PHYSICS
GRADUATE STUDY GUIDELINES

A Collection of Program and University
Regulations and Operating Procedures

Chemical Physics Ph.D. Program
This brochure is designed to present the most pertinent information on the courses, examinations, and other requirements of the Chemical Physics Ph.D. program. The Graduate School Catalog should be consulted for supplementary information.

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1. ENTRY INTO THE GRADUATE PROGRAM IN CHEMICAL PHYSICS

A. Admission Into the Program

The Chemical Physics program confers only the Ph.D. degree. Master’s degree students will continue to follow the course of study laid out by either the physics or the chemistry departments. Admission of a student into the Chemical Physics program can occur by one of two routes: either (i) direct admission into the Chemical Physics Ph.D. program following the completion of an undergraduate degree, or (ii) admission into the Master’s degree program of either the chemistry or physics department with subsequent induction into the Chemical Physics program upon satisfactory performance in courses and/or the comprehensive examination (see below).

Admission into the program will be decided by the individual departments’ admissions committees under consultation with the chemical physics admissions committee. The department through which a student gains admission to the program will henceforth be referred to as the “admitting department.” The chemical physics admissions committee is comprised of one physics and one chemistry faculty member. Financial support for an incoming student, usually in the form of a teaching or research assistantship, is administered by the admitting department and/or by individual research groups.

B. Graduate Record Examination Scores and Transcripts

Scores on the Graduate Record Examination (GRE) must be filed with the Graduate School by the student prior to admission to graduate standing. The Graduate School requires an undergraduate grade point average of 3.0 or better for formal admission into a Ph.D. program at the university. A student entering the program upon completion of a Master’s degree at another institution may use the graduate grade point average to meet this requirement.
C. Registration Exams

Registration exams are administered separately by the chemistry and physics departments to all entering graduate students prior to registration. They are used to assess each student’s background and to search out deficiencies in the student’s background in molecular physics or physical chemistry so that more effective course advisement can be given. Chemical physics students gaining admission to the program through the chemistry department are required to take the registration exam in physical chemistry, as well as exams in mechanics (covering basic Newtonian mechanics at the level of a first-semester course in physics) and mathematics (covering calculus, differential equations, and some complex analysis).

The registration exams also serve the role of the Qualifying Examinations required by the Graduate School for the Ph.D. program (consult the catalog).
Appendix A
Student Guidelines

D. Curriculum

The Chemical Physics program curriculum consists of a core of fifteen (15) credits of required courses (5 courses), 31 credits of electives [of which 12 credits may be “Independent Study”, three (3) may be “Dissertation”, and eight (8) credits may be “Physical Chemistry Colloquium”], two (2) credits of student seminar (Chemistry 790 or Physics 790), and 24 credits of “Dissertation”. The five required courses are

1. PHYS 701 Mathematical Physics
2. CHEM 757 Quantum Chemistry
   or PHYS 721 Quantum Theory I
3. PHYS 722 Quantum Theory II
   or CHEM 750 Theoretical Physical Chemistry
4. CHEM 755 Statistical Thermodynamics
   or PHYS 732 Statistical Mechanics
5. PHYS 702 Classical Mechanics
   or CHEM 752 Chemical Kinetics
   or PHYS 725 Laser Physics

Students must take at least two 700-level courses in each of the Chemistry and Physics departments to satisfy their course requirements. Elective courses at the 600- or 700-level must be approved by the student’s Graduate Advisory Committee.

E. Choice of Research Advisor

The Chemical Physics program requires a completed research dissertation.

During the first semester in residence, each student should consult with the various faculty members associated with the Chemical Physics program. These consultations should be arranged by the student. They generally involve discussion of the type of research programs of interest to the faculty member. After these consultations, the student chooses a faculty member under whose direction the dissertation research will be performed. The faculty member is asked by the student to serve as the student’s research director and advisor. Choice of the research director should be made no later than the end of the second semester of graduate studies. A list of those faculty affiliated with the Chemical Physics program who are eligible to function as research advisors for students in the program is given below.

Chemistry

Mario A. Alpuche
Frank G. Baglin
Sean M. Casey
Joseph I. Cline

Physics

F. Patrick Arnott
Bruno Bauer
Andrei Derevianko
Roberto Mancini
F. Graduate Advisory Committee

After a student has chosen a research advisor, he or she should consult with the advisor to form a Graduate Advisory Committee. The student should be prepared to suggest members for the committee which must have at least five members: two from each of the chemistry and physics departments (including the research advisor), and one from an outside department.

The student initiates the paperwork necessary to form this committee and the research advisor acts as its chairman. The committee is responsible for formally approving the student’s program of study and for administering the Oral Comprehensive Exam and the Final Oral Examination upon the completion of the research dissertation. The appointment of this committee should be accomplished no later than the beginning of the student’s third semester at the university.

G. Program of Study

Students admitted to graduate standing must have their initial course work approved by the Graduate Advisory Committee. An approved Program of Study must be submitted to the Graduate School no later than the completion of 24 graduate credits.

The Graduate Advisory Committee should be convened by the research advisor to discuss the student’s proposed program of study. Generally, the student and advisor work together to decide on the courses that will be taken by the student during the graduate program. These courses are selected to fit the student’s vocational objectives and provide background useful for research while at the same time meeting the requirements for the Ph.D. degree (see Section III). The student will need to pick up the Program of Study forms from the Graduate School office in Getchell Library and have these forms filled out prior to meeting with the Graduate Advisory Committee. The student should arrange a suitable time and place for the meeting after consulting with committee members. The committee then meets with the student to discuss and approve the proposed program. As part of this meeting, the student might be asked to give a brief presentation describing his or her proposed research. This helps the committee become better acquainted with the student and allows it to better evaluate the proposed course of study. Completion of the program of study form is required for an RA or TA contract in the second year of study.
II. GENERAL REQUIREMENTS

A. Credit Hours

Registration in 9 graduate credits or more each semester is considered full time. The normal course load taken by students who are serving as regular Teaching Assistants is about 9 credits.

B. Course Work Performance

1. UNR Overall Graduate Course
   Work GPA of 3.0 or Better . . . . . . . . . . . . . . . . . . . Good Standing

2. UNR Overall Graduate Course
   Work GPA Balance Below 3.0 . . . . . . . . . . . . . . Probationary Status

3. UNR Overall Graduate Course
   Work GPA Balance of Seven or
   More Grade Points Below 3.0 . . . . . . . . . . . . . . Dropped from Graduate Standing

C. Comprehensive Examinations

In addition to the formal course work, written and oral comprehensive examinations must be taken by all students. The written part of the comprehensive examination will be taken by the student within one year of the completion of the (five) required courses in the Chemical Physics program, but can be taken anytime after four of the required courses have been completed. The exam will focus on the material that is covered by those courses and shall be supervised by an annually rotating committee consisting of one Chemistry and one Physics faculty member. This committee coordinates the writing of the exam, soliciting problems from those faculty who have recently taught the required courses.

The oral part of the comprehensive examination is taken immediately after completion of the written comprehensive exam (i.e. within 1-2 weeks) and is supervised by the student’s Graduate Advisory Committee. The oral examination will cover the same broad range of topics treated by the written comprehensive exam and is designed to allow the Graduate Advisory Committee to better evaluate the student’s general background in chemical physics. General questions pertaining to the student’s dissertation research project may also be posed during the oral comprehensive.

Successful completion of both the written and the oral parts of the comprehensive examination will be necessary for the student’s continued good standing in the Chemical
Physics program. Unsatisfactory performance on the first attempt at the comprehensive examination may be rectified by retaking both parts of the exam within six months of the first attempt. Comprehensive exam results are acceptable toward fulfilling the Ph.D. degree requirements for a period of four (4) years following the end of the semester in which the examination was satisfactorily completed.

D. Seminars

Students are also required to participate in the seminar program. This means attending both students’ seminars and seminars presented by visitors to the physics and chemistry departments. All students must give a minimum of two (2) seminars (see Section III.C), of which one will function as a “final” seminar delivered upon completion of the dissertation.

E. Time Limitation for Completion of Advanced Degrees

All requirements for the doctoral program, excluding prerequisite graduate course work or master’s degrees, must be completed within eight years from the time of admission. It should be noted that the average Ph.D. degree in Chemical Physics should take about five years. Be sure to consult the time limits on comprehensive examinations (Section C above).

Students must register for an appropriate course load at least one semester or summer session each year, or obtain an “approved leave” from the admitting department. Unless these approved leaves are part of the student’s Graduate School records, extensions of the eight year time limitation will not be approved by the Graduate School.

F. Admission to Chemical Physics From an M.S. Program in Chemistry or Physics

A student wishing to enter the Chemical Physics Ph.D. program while enrolled in a Master’s program in either Chemistry or Physics must first inform the research advisor of this intention. The research advisor, with the approval of the Chemical Physics faculty, then initiates the necessary paperwork through the Office of the Dean of the Graduate School. This includes adjusting the size of the Graduate Advisory Committee from three to five members. The new committee is then responsible for determining what portion of the Chemical Physics Ph.D. requirements remain to be fulfilled by the student, including both curriculum and comprehensive examination requirements.

Students wishing to enroll in the Chemical Physics program with an M.S. in either Chemistry or Physics (or another subject deemed acceptable by the Chemical Physics admissions committee) earned at either UNR or another institution should apply for the
program the same way as a student entering directly from an undergraduate program. The Chemical Physics admissions committee, in accordance with Graduate School regulations, will then determine what portion of the Chemical Physics Ph.D. requirements are transferable and which requirements remain to be fulfilled by the student. The Graduate School currently permits a maximum of 9 credits to be transferred from another institution. Note that a master’s thesis may not take the place of the Ph.D. dissertation either in whole or in part.
### III. REQUIREMENTS FOR THE Ph.D. DEGREE

**A. Minimum Credit Requirements**

The **minimum credit requirements** for the Ph.D. degree are listed below:

<table>
<thead>
<tr>
<th>Course-Credit Distribution</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required course credits</td>
<td>15</td>
</tr>
<tr>
<td>Independent studies (CHEM 793 or PHYS 792)</td>
<td>12</td>
</tr>
<tr>
<td>Seminar</td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td>19</td>
</tr>
<tr>
<td><strong>TOTAL Course Credits</strong></td>
<td><strong>48</strong></td>
</tr>
<tr>
<td>Dissertation Credits</td>
<td>24</td>
</tr>
<tr>
<td><strong>TOTAL CREDITS</strong></td>
<td><strong>72</strong></td>
</tr>
</tbody>
</table>

1 A minimum of two (2) seminar credits must involve an original oral presentation by the student.

2 May include up to eight (8) credits of CHEM 794 (“Physical Chemistry Colloquium”) and up to three (3) credits of PHYS 799 or CHEM 799 (“Dissertation”)

**B. Comprehensive Examinations**

Students must achieve satisfactory performance on the written and oral comprehensive examinations, as determined by the Comprehensive Examination Committee and the Graduate Advisory Committee, within one year of completing the required courses. Failure on the first attempt of either the written or the oral examination may be rectified by taking both parts of the examination within six months of the failure. *(See Section II.C for a description of the written and oral parts of the examination.)*

*Comprehensive exams are acceptable for a period of four (4) years for the Ph.D. degree following the end of the semester in which the comprehensive examination requirement was fulfilled.* *(See II.C)*
Appendix A
Student Guidelines

C. Language Requirement

The Chemical Physics program does not require demonstrated proficiency in a foreign language as part of its degree requirements.

D. Seminar Requirements

Students are expected to give their first seminar no later that their third semester in graduate school. The first seminar is given on a literature topic which is chosen from a list provided by the chemistry faculty if the student is enrolled in CHEM 790, or is chosen by the student in consultation with the research advisor if the student is enrolled in PHYS 790. A “B” is the minimum acceptable grade for satisfying the seminar requirement. Students should consult with the faculty member in charge of either CHEM 790 or PHYS 790 to get an idea of what is expected. Also students should carefully consult the “Seminar Guidelines” available in the chemistry department office.

The second student seminar is the final public presentation of the Ph.D. research, which is to be given on the same day as the Final Oral Examination, just before the examination.

E. Admission to Candidacy

The student should apply for admission to candidacy after passing the comprehensive examination. The student must initiate this procedure using forms obtained from the Graduate School and should submit the application for admission to candidacy no later than eight calendar months before the date of graduation. Consult the University Catalog for further details, especially concerning the time limit on Candidacy.

F. Approval of Dissertation and Final Oral Examination

After completion of a dissertation, the student is required to discuss it and defend it to the Graduate Advisory Committee. Consult the University Catalog for information about the required dissertation format, dates of submission, number of required copies, etc. A draft of the dissertation should be given to members of the examining committee (Graduate Advisory Committee prior to the final typing so that corrections and suggestions can be incorporated. The completed, unbound dissertation must be submitted to the committee at least one week before the final examination. The meeting in which the dissertation and related topics are discussed is the Final Oral Examination. Consult the University Catalog for other details.
IV. GRADUATE STUDENT EVALUATION PROCEDURES

Graduate students in the Chemical Physics program are evaluated yearly by the Chemical Physics faculty to assess progress toward completion of requirements, including especially research. The purpose of these evaluations is to determine the candidate’s overall fitness for his or her chosen program. In addition, the evaluations should bring out any areas of unsatisfactory progress so that the student can be aware of them and correct them.

Included in this brochure is a Self-Evaluation Record and a Timetable of Events and the GS A-1 form from the Graduate School. The Self-Evaluation Record is intended to provide information about completed course work and comprehensive exams.

The timetable is a schedule of times for completion of the requirements for the Ph.D. degree within four to five years, and is intended as a guide to the faculty in measuring progress. It should be noted that the Timetable is meant to be an appropriate time schedule of events— a goal to aim for— and not a schedule of firm deadlines for the completion of the requirements. It is recognized that it may not be possible to adhere to the schedule because of circumstances such as difficulty in scheduling classes, entering the program with deficiencies, etc. However, serious deviation from the schedule may be an indication of unsatisfactory progress.

The GS A-1 form describes the steps to be followed in pursuing a graduate degree program.
V. TIMETABLE OF EVENTS

For students in the Ph.D. program entering with a Bachelor’s Degree, this section gives a recommended schedule for a four to five year program. The schedule appropriate for students entering the program with a Master’s degree will vary from individual to individual depending on the Chemical Physics requirements that are fulfilled by the student’s record in a Master’s program. Students falling in this category should consult with the research advisor or the director of the Chemical Physics program for a corresponding timetable of events.

A. First Year of Study

The following must be accomplished by the end of the first year of graduate study:

(a) Take registration examination before registration.

(b) Choose a research director by the end of the second semester and develop a graduate program in consultation with the Graduate Advisory Committee before the beginning of the third semester.

B. Second Year of Study

The following should be accomplished by the end of the second year of graduate study:

(a) Present first seminar by the end of the third semester.

(b) Complete the required course work (if scheduling permits).

Along with the completion of these requirements, some definite progress in dissertation research should be made by the end of the second year.

C. Third Year of Study

The comprehensive examinations must be taken within one year after completion of the required courses. Application for admission to candidacy should be filed soon after the comprehensive examination has been passed and other degree requirements have been completed. By the end of the sixth semester, the student has ideally spent two summers, one or two semesters fully, and two semesters partly on the dissertation research. Thus, significant progress in research work should have been made by this time.
D. Fourth and Fifth Years of Study

The completion of research and writing of the dissertation should be made during the fourth and fifth years. The final oral examination should be completed shortly after the dissertation has been written. This examination should be completed not later than the end of the fifth year.
SELF EVALUATION RECORD
CHEMICAL PHYSICS PROGRAM

Name: _______________________________________

GRADUATE STUDY PROGRAM

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Title</th>
<th>Credits</th>
<th>Date Completed</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Required*

---

*Elective*

---

COMPREHENSIVE EXAMINATIONS

Completion of Written Exam ____________________________ Date

Completion of Oral Exam ____________________________ Date
SEMinar REQUIREMENTS

Completion of First Seminar __________________________
                                        Date

Completion of Final Seminar __________________________
                                        Date
Appendix B
Qualifying Examinations

Chemical Physics Program
Placement Examination in Mathematics

**Instructions:** Please answer the following questions in the space provided. The exam consists of 12 problems worth ten (10) points each. It is to your advantage to write as neatly as possible as partial credit may be given. You will be given two hours to complete the exam.

**Note:** It is recommended that you read through the exam and first work the problems that are easiest for you. Since this exam is to be used for placement purposes only, it is not expected that you will be familiar with all of the topics covered here.

1. Determine the location(s) of all the inflection points on the curve \( y = x^2 e^{-x} \).
   
   **Note:** An inflection point occurs when the curvature of a function changes sign.

2. Compute the first three terms in the power series expansion of \((1 + \sin x)^{-1/2}\) about \( x = 0 \).

3. Find the transpose, Hermitian adjoint, and inverse of the matrix
   \[
   \begin{pmatrix}
   1 & 0 \\
   0 & 1 \\
   \end{pmatrix}
   \]

4. Evaluate
   \[
   \begin{pmatrix}
   1 & 0 \\
   0 & 1 \\
   \end{pmatrix}
   \]

5. Evaluate the following expressions:
   
   (a) \( i^{1/2} \)
   
   (b) \[
   \begin{pmatrix}
   0 & 1 \\
   1 & 0 \\
   \end{pmatrix}
   \]

6. Find the eigenvalues of the matrix
   \[
   \begin{pmatrix}
   1 & 0 \\
   0 & -1 \\
   \end{pmatrix}
   \]  This matrix is represented in some arbitrary set of basis vectors. Write down the result of transforming this matrix to a new basis corresponding to its eigenvectors.

7. Write down a 2×2 matrix that has the effect of rotating an arbitrary vector \((x, y)\) clockwise through an angle of \(\pi/3\) in the \(xy\)-plane. What is the inverse of this matrix?

8. A roof gutter is to be made from a long strip of sheet metal, 24 cm wide, by bending up equal amounts at each side through equal angles. Find the angle \(\theta\) and the dimensions that will make the carrying capacity of the gutter as large as possible (that is, maximize the cross-sectional area— see picture below).
9. Express the integral \( \int \) in planar polar coordinates \((r, \theta)\) and evaluate it.

10. Find the general solution of the first order differential equation

then find the particular solution that satisfies the boundary condition \((x,y) = (1,1)\).

11. Find the general solution to the second-order differential equation, \( y'' - 4y = 10 \), where \( y \) is a function of \( x \).

12. The Legendre equation is the second-order differential equation

where \( \lambda \) is an integer constant. Change the independent variable in this equation from \( x \) to \( \theta \) using the relation \( x = \cos \theta \) and derive an equivalent form for this equation in terms of differentials with respect to \( \theta \).
Chemical Physics Program
Placement Examination in Mechanics

**Instructions:** Please answer the following questions in the space provided. The exam consists of 8 problems worth fifteen (15) points each. It is to your advantage to write as neatly as possible as partial credit may be given. If you wish, you may use scratch paper, but for full credit, you should clearly label problems and attach the scratch paper to the exam. You will be given two hours to complete the exam.

**Note:** It is recommended that you read through the exam and first work the problems that are easiest for you. Since this exam is to be used for placement purposes only, it is not expected that you will be familiar with all of the topics covered here.

1. Multiple choice problems—enter the letter of the most appropriate answer in the blank on the left. (3 points each).

   _____ (i) A rock is thrown vertically into the air. At the very top of its trajectory, its acceleration is
   
   (a) 0  (b) 9.8 m/sec\(^2\)  (c) between 0 and 9.8 m/sec\(^2\)

   _____ (ii) The acceleration that a skydiver of mass 100 kg experiences when air resistance builds up to 500 newtons is (\(g\) represents the gravitational acceleration at the surface of the earth)
   
   (a) 0.2 \(g\)  (b) 0.3 \(g\)  (c) 0.4 \(g\)  (d) 0.5 \(g\)  (e) > 0.5 \(g\)

   _____ (iii) If the sun collapsed to a black hole, the resulting gravitational influence by the new configuration on the earth would be
   
   (a) greater  (b) no different  (c) less

   _____ (iv) You are driving down the highway and a bug spatters into your windshield. Which undergoes the greater change in momentum?
   
   (a) the bug  (b) your car  (c) both the same

   _____ (v) A 1.0-kg ball dropped from a height of 2 meters rebounds only 1.5 meters after hitting the ground. The amount of energy converted to heat is about (\(J =\) Joules)
   
   (a) 0.5 \(J\)  (b) 1 \(J\)  (c) 1.5 \(J\)  (d) 2 \(J\)  (e) > 2 \(J\)
2. A force of 100 N accelerates two blocks of mass 20 and 5 kg across a frictionless surface as shown in the figure. Find the force exerted by the 5-kg block on the 20-kg block. Give the magnitude and the direction.

3. A rope of mass m lies on a table. Derive an expression for the force required to lift the rope from the table at a constant speed.

4. The figure show a ballistic pendulum, a system for measuring the speed of a bullet. The bullet (mass \( m \)) is fired into a block of wood (mass \( M \)), suspended like a pendulum, and makes a completely inelastic collision with it. After the impact, the block swings up to a maximum height \( y \). Given the following values, what is the speed, \( v \), of the bullet? \((m = 5.00 \text{ g}, M = 2.00 \text{ kg}, y = 3.00 \text{ cm})\)

5. A block is on a horizontal surface that is moving horizontally with simple harmonic motion of frequency 2.0 sec\(^{-1}\). The coefficient of static friction between the block and the surface is 0.50. How great can the amplitude of the harmonic motion be if the block does not slip along the surface?

6. Four circular objects, a circular hoop, a circular disk, a hollow sphere, and a solid sphere, all of the same radius and mass roll without slipping down an inclined plane, starting from rest at the same height. Which of these objects will reach the bottom first and why. The moments of inertia for each of the objects is as follows:
   - circular hoop: \( I = Mr^2 \)
   - circular disk: \( I = \frac{1}{2} Mr^2 \)
   - hollow sphere: \( I = \frac{2}{3} Mr^2 \)
   - solid sphere: \( I = \frac{2}{5} Mr^2 \)

7. Masses \( m_1 \) and \( m_2 \) are connected by a light cord of negligible mass which is free to move over a frictionless pulley which also has negligible mass. The coefficient of friction between \( m_2 \) and the slope is denoted \( \mu_k \). If \( m_1 = m_2 = M \), find expressions for the acceleration of the system for the following cases:
   *Hint:* Solve for the general case first, then substitute these values into your result.
(a) \( \theta = 30^\circ, \mu_k \neq 0 \)
(b) \( \theta = 30^\circ, \mu_k = 0 \)
(c) \( \theta = 0^\circ, \mu_k \neq 0 \)

8. A bead slides along a smooth rigid wire bent in the shape of a parabola \( z = c \ r^2 \) (see figure below). The bead rotates in a circle of radius \( R \) when the wire is rotating about its vertical symmetry axis with angular velocity \( \omega \). Find the value of \( c \) in terms of the other parameters in the problem.
# Presentations made by Chemical Physics Students at Scientific Meetings

<table>
<thead>
<tr>
<th>Presenting Student</th>
<th>Research Advisor</th>
<th>Title of Presentation</th>
<th>Meeting, Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. Spasov</td>
<td>Ervin</td>
<td><em>Collision-induced Dissociation of Anionic Copper-group Clusteres and Their Monocarbonyls</em></td>
<td>47th ASMS Conference of Mass Spectrometry and Allied Topics, Dallas, TX, 6/99</td>
</tr>
<tr>
<td>M. Dogbevia</td>
<td>Ervin</td>
<td><em>Catalytic Oxidation of CO by Palladium Clusters: Reaction Energetics</em></td>
<td>Conf. on Ion Chemistry and Mass Spectrometry, Lake Arrowhead, CA, 1/02</td>
</tr>
<tr>
<td>J. Barr</td>
<td>Cline</td>
<td><em>Collision induced product rotational orientation in inelastic bi-molecular cross beam scattering of NO with N₂</em></td>
<td>Western Spectroscopy Association Meeting, Asilomar, CA, 1/03</td>
</tr>
<tr>
<td>J. Barr</td>
<td>Cline</td>
<td><em>Photoisomerization kinetics of a prototype light-driven molecular motor</em></td>
<td>51st Annual Western Spectroscopy Association Conference, Pacific Grove, CA, 1/04</td>
</tr>
</tbody>
</table>
## Appendix C
### Student Presentations (cont.)

<table>
<thead>
<tr>
<th>Presenting Student</th>
<th>Research Advisor</th>
<th>Title of Presentation</th>
<th>Meeting, Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>K. Burtt</td>
<td>Cline</td>
<td><em>Molecular dynamics simulations on the operation of a light-driven molecular motor</em></td>
<td>51st Annual Western Spectroscopy Association Conference, Pacific Grove, CA, 1/04</td>
</tr>
<tr>
<td>N. Sassin</td>
<td>Ervin</td>
<td><em>Design of a quadruple ion trap reflectron mass spectrometer</em></td>
<td>Conference on Mass Spectrometry and Ion Chemistry, Lake Arrowhead, CA, 1/04</td>
</tr>
<tr>
<td>M. Dogbevia</td>
<td>Ervin</td>
<td><em>Binding energies of CO on gold metal cluster anions</em></td>
<td>Conf. on Ion Chemistry and Mass Spectrometry, Lake Arrowhead, CA, 1/04</td>
</tr>
<tr>
<td>M. Dogbevia</td>
<td>Ervin</td>
<td><em>Energetics of adsorption of O, O$_2$, CO and CO$_2$ on gold dimer anions</em></td>
<td>Gordon Conference on Gaseous Ions: Structures, Energetics, and Reactivity, Ventura, CA, 3/05</td>
</tr>
<tr>
<td>S. Everhart</td>
<td>Cline</td>
<td><em>Photodissociation of Trapped Chromophore Ions</em></td>
<td>Western Spectroscopy Association 53rd Annual Conference, Asilomar, CA, 2/06</td>
</tr>
<tr>
<td>N. Sassin</td>
<td>Ervin</td>
<td><em>Mass Spectrometry Techniques to Study Photodissociation Inside a Quadrupole Ion Trap</em></td>
<td>Northwest Regional Meeting, American Chemical Society, Reno, NV, 1/06</td>
</tr>
<tr>
<td>N. Sassin</td>
<td>Ervin</td>
<td><em>Photodissociation of Rhodamine Ions in a Quadrupole Ion Trap/Time-of-Flight Mass Spectrometer</em></td>
<td>Conference on Ion Chemistry and Mass Spectrometry, Lake Arrowhead, CA, 1/06</td>
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### Student Presentations (cont.)

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<tr>
<th>Presenting Student</th>
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<th>Title of Presentation</th>
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<tr>
<td>N. Sassin</td>
<td>Ervin</td>
<td>Photodissociation and Fluorescence of Rhodamine Ions in a 3D Trap</td>
<td>Gordon Research Conference on Ion Spectroscopy, Santa Barbara, CA, 2/07</td>
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<tr>
<td>S. Everhart</td>
<td>Cline</td>
<td>Photodissociation and Fluorescence of Chromophores in a Paul Ion Trap</td>
<td>Western Spectroscopy Association 54th Annual Conference, Asilomar, CA, 2/07</td>
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<td>J. Agbo</td>
<td>Leitner</td>
<td>Vibrational Energy Flow within the Dimeric Hemoglobin Scarpharca Inquivalvis</td>
<td>American Chemical Society National Fall Meeting, Boston, MA, 8/07</td>
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<td>N. Sassin</td>
<td>Ervin</td>
<td>Slow Energy Transfer: A Fluorescence and Spectrometry Study of Rhodamine 575 Cations Confined to a Paul Trap</td>
<td>56th ASMS Conference on Mass Spectrometry, Denver, CO, 6/08</td>
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<tr>
<td>S. Everhart</td>
<td>Cline</td>
<td>Multi-Photon Dissociation Kinetics of Trapped Chromophores Probed by Mass Spectroscopy and Fluorescence</td>
<td>55th Annual Western Spectroscopy Association Conference, Asilomar, CA, 2/08</td>
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<td>Photodissociation and Fluorescence Kinetics of Rhodamine 575 Cations in a Quadrupole Trap</td>
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<td>N. Sassin</td>
<td>Ervin</td>
<td>Slow energy transfer: A Fluorescence and Spectrometry Study of Rhodamine 575 Cations Confined to a Paul Trap</td>
<td>56th ASMS Conference on Mass Spectrometry, Denver, CO, 6/08</td>
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<td>Photoisomerization of Substituted Dibenzofulvene Rotors</td>
<td>56th Annual Western Spectroscopy Association Conference, Asilomar, CA, 1/09</td>
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<td>Photoisomerization of Substituted Dibenzofulvene Rotors</td>
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<tr>
<td>O. Certik Winkler</td>
<td>FEMTEC 2009, Granlibakken Conference Center, Lake Tahoe, CA, USA, January 5-9, 2009</td>
<td>Adaptive finite element method for electronic structure</td>
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<tr>
<td>O. Certik Winkler</td>
<td>SIAM Conference on Computational Science and Engineering (CSE09), Miami, FL, USA, March 2-6, 2009</td>
<td>Adaptive finite element method for electronic structure</td>
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<tr>
<td>O. Certik Winkler</td>
<td>UC Davis, invited presentation on adaptive finite element method for electronic structure calculations by Dr. John Pask (October 2009)</td>
<td>Adaptive finite element method for electronic structure</td>
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<tr>
<td>O. Certik Winkler</td>
<td>Keynote lecture at the Junior Science and Humanities Symposium, Reno, NV, March 18, 2010</td>
<td>Making Scientific Computing Available to Everyone</td>
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</table>
Appendix C
Student Presentations

Publications Co-Authored by Chemical Physics Students

1999


2000


2001


Appendix C
Student Presentations


2002


2003


2004


2005


2006

2007


2008


2009

## Chemical Physics Course Offerings, 1999-2010

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<th>Core Courses</th>
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*Courses offered, but enrollment insufficient to teach.

Core Courses:
- PHYS 701: Mathematical Physics
- CHEM 755: Statistical Thermodynamics
- CHEM 757: Quantum Chemistry
- PHYS 721: Quantum Theory I
- PHYS 722: Quantum Theory II
- CHEM 750: Theoretical Physical Chemistry

Elective Course:
- CHEM 754: Molecular Spectroscopy
- PHYS 704: Computational Techniques in Physical Science
- PHYS 708: Nuclear Physics
- PHYS 711: Electromagnetic Theory I
- PHYS 712: Electromagnetic Theory II
- PHYS 740: Fluid Dynamics
- PHYS 761: Atomic and Molecular Physics
- PHYS 771D: Advanced Topics in Quantum Theory
## Cont’d. Chemical Physics Course Offerings, 1999-2010

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*Courses offered, but enrollment insufficient to teach.*
CURRENT POSITION

July 2009 to date

Assistant Professor, University of Nevada, Reno, Department of Chemistry

POSTDOCTORAL EXPERIENCE

September 2007 to June 2009

Postdoctoral Fellow, The Ohio State University, Department of Chemistry, Dr. Yiyong Wu.  
Main Research Area: Electrochemical characterization of semiconductors and solar cells.

February 2005 to August 2007

Postdoctoral Fellow, The University of Texas at Austin, Department of Chemistry and Biochemistry, Center for Electrochemistry, Prof. Allen J. Bard.  
Main Research Area: Scanning electrochemical microscopy studies of electrocatalysts.

EDUCATION

January 1999 – February 2005

Doctor of Philosophy in Analytical Chemistry  
Mississippi State University, Department of Chemistry, Mississippi, USA  

September 1993 - August 1998

Bachelors Degree in Chemical Engineering  
Universidad Autónoma de Yucatán, Mérida, Yucatán, México.  

AWARDS

2004 Research Award from the College of Arts and Science, sponsored by the Offices of the Vice President for Research and the Vice President for Agriculture, Forestry, and Veterinary Medicine, Mississippi State University, Mississippi, USA.

2003 Summer “Colin Garfield Fink” Summer Research Fellowship of the Electrochemical Society.
2003 Travel Award, Physical Chemistry Division of the Electrochemical Society, USA.
(To attend the 203rd Meeting of the Electrochemical Society, Paris, France, April 27-May 2).

2001-2002 “Donald Zacharias” Award for Teaching Assistant, Doctoral Level,
Mississippi State University, Mississippi, USA.

1997 Fellowship FOMES 97-32-02, “Vinculación de estudiantes destacados a la
investigación” for Undergraduate Thesis, Universidad Autónoma de Yucatán, Mérida,
Yucatán, México

RESEARCH EXPERIENCE

Electrochemical studies of semiconductors. Characterization of new semiconductor
nanomaterials, e.g., nanoparticles and nanowires, for their use in dye-sensitized
electrochemical solar cells (postdoctoral research at The Ohio State University).

Scanning electrochemical microscopy (SECM) studies of electrocatalysts. Catalysts
based on Ti and Pd for the oxygen reduction reaction for fuel cells was studied with the
scanning electrochemical microscope and surface characterization (postdoctoral research at
the University of Texas at Austin).

Electrochemical Impedance. Applied localized impedance measurements to control tip-
sample separation in SECM (see below). Used electrochemical impedance spectroscopy to
characterize electrochemical solar cells electrodes and to measure exchange current densities
of Pt electrodes in I/I₃ electrolytes.

Nanomaterials Preparation and Characterization. Experience in the preparation and
characterization of electrocatalysts for fuel cell cathodes and in the preparation of
semiconductor nanoparticles. Techniques include atomic force microscopy (AFM), scanning
electron microscopy and X-ray powder diffraction

Self-Assembled Monolayers studies with SECM. Rates of electron transfer of alkanethiols
were measured with SECM as a function of electrochemical potential. The potential
dependence of the electron transfer rates was used to discriminate from contributions of
pinholes and defects (postdoctoral research at the University of Texas at Austin).

Combined SECM with electrochemical analysis. Combined fast scan anodic stripping
voltammetry with SECM for selective detection of heavy metals during imaging
experiments; utilized cathodic stripping voltammetry to image chloride generation and
depletion over a surface.

Metal corrosion and passivation. Used cyclic voltammetry and atomic force microscopy to
characterize passive films on AISI 316 stainless steel immersed in concrete-pore simulation
solutions.
Atmospheric Corrosion of Metals. Measured and interpreted atmospheric parameters to evaluate their impact on atmospheric corrosion rates of metals. Undergraduate Research Experience. CINVESTAV, Merida, Yucatan, Mexico.

Designed techniques to control the probe-sample separation in SECM. Developed the impedance mode that measures the impedance of the tip to control tip-sample distance. Applied shear force detection using a quartz tuning fork. These methods allow SECM to collect independent topographic information.

Co-op at “Industria Salinera de Yucatan”, (Salt Industries of Yucatan) Las Coloradas, Yucatan, Mexico, doing corrosion measurements), Summer 1997. Monitoring of parameters for atmospheric corrosion in highly aggressive (Chloride) atmosphere.

PUBLICATIONS

a) Peer Reviewed Journals


7) Mario A. Alpuche-Avilés, John E. Baur and David O. Wipf, “Imaging of Metal Ion Dissolution and Electrodeposition by Anodic Stripping Voltammetry-Scanning


14) Panitat Hasin, Mario A. **Alpuche-Avilés** and Yiyong Wu, “Electrocatalytic activity of graphene multilayers towards I$_3^-$: effect of preparation conditions and polyelectrolyte modification", *Journal of Physical Chemistry C, accepted*

b) **Publication in International Book (reviewed)**


c) **International Conference Proceedings**

d) Other


**GRANT AWARDS**

1) “Liquid Crystal-Based Photovoltaic Cells”. Status: Approved
   Sponsor: Nevada Renewable Energy Consortium (NVREC)
   PI: Benjamin King (PI), UNR Chemistry, co-PI: Mario Alpuche, UNR Chemistry, co-PI: Chulsung Bae, UNLV Chemistry, co-PI: Richard Purcell, DRI-Reno
   Total Federal Funds: $250,000 (Alpuche’s Share $62,500)
   Cost Share: 20% required ($15,625)

2) “Electrochemical Problems of renewable problem”.
   Sponsor: NV Energy – College of Engineering
   PI: Mario A. Alpuche Aviles.
   Total: $10,000
   Dates: 2010 - 2011

**CONFERENCE PRESENTATIONS AS PRESENTING AUTHOR**

a) International

1) **Mario A. Alpuche Avilés** and David O. Wipf, “Application of Combined Stripping Voltammetry Techniques and SECM to Electro-Deposition and Generation Studies”, Joint International Meeting: 210th Meeting of the Electrochemical Society, XXI Congreso de la Sociedad Mexicana de Electroquímica, October 29-November 2, 2006, Cancun, Mexico.


b) National

3) Lucien Veleva, **Mario A. Alpuche-Avilés**, “Time of Wetness (TOW) and Surface Temperature Characteristics of Corroded Metals in Humid Tropic Climate”, Oral


c) Regional

8) **Mario A. Alpuche-Avilés**; Gayatri Natu; Yiying Wu, “Metal Oxide Nanomaterials: Tuning Band Edges for Dye-Sensitized Solar Cells (DSSC)”. 40th Central Regional Meeting of the American Chemical Society, June 10-14, 2008 Columbus, OH, United States,

**CONFERENCE PRESENTATIONS AS COAUTHOR**

a) International


b) National


c) Regional

11) Gayatri Natu, Yanguang Li; Mario A. Alpuche-Avilés, Yiyinng Wu. “Integration of Structurally and Compositionally Diverse Metal Oxide Semiconductor Nanomaterials for Photovoltaic Applications.” (Poster) 40th Central Regional Meeting of the American Chemical Society, June 10-14, 2008, Columbus, OH, United States.

TEACHING EXPERIENCE

University of Nevada, Reno, Department of Chemistry
Analytical Chemistry, Chem 300.
Fall 2009

TEACHING EXPERIENCE DURING PhD STUDIES

Department of Chemistry, Mississippi State University,
Spring 1999
   Teaching Assistant in the preparatory room: prepared solutions for introductory chemistry laboratories.
   (Research Assistant Summer 1999 and Fall 1999)

Spring 2000 to Spring 2003:
   Teaching Assistant of Physical Chemistry Laboratory (CH 4411) at Mississippi State University. Modified and designed laboratory experiments to facilitate undergraduate chemistry and chemical engineering students’ learning.

ADDITIONAL TEACHING EXPERIENCE (during BS University studies)


TECHNICAL EXPERTISE

Electrochemical Analysis: Extensive experience in electrochemical impedance spectroscopy (EIS), Scanning Electrochemical Microscopy (SECM), Cyclic voltammetry (CV), anodic and cathodic stripping voltammetry, AC voltammetry, rotating disk electrode. Experience includes operation of several commercial instruments (CH Instruments, BAS, Solartron, Gamry) and development and implementation of custom-built instrumental setups.

Analytical Chemistry Techniques. Extensive UV-Vis spectroscopy for liquid and solid samples, basic fluorescence and ICP-Atomic absorption and ICP-MS for elemental analysis.

**Metal deposition**: electrochemical deposition and physical metal deposition methods, both evaporation and electron beam evaporation.

**Electronics.** Working understanding of electronic principles, data acquisition, Lab View programming and operation of oscilloscope and lock-in amplifier.

**Reviewer.** Reviewed papers for Analytical Chemistry, edited by the American Chemical Society and Electrochemistry Communications edited by Elsevier.

**Clean Room training.**

**Languages:** English and Spanish (Native)

**PROFESSIONAL ORGANIZATIONS**

**Chemistry Graduate Students Association** of the Department of Chemistry of Mississippi State University  
Member since 1999 – December 2004  
**President, Spring 2004 – December 2004 of the Chemistry Graduate Students Association** of Mississippi State University  
Faculty advisor: Alicia Beatty.

**The Electrochemical Society**, Member Since 1999

**Undergraduate: President of the Student Association** of the Chemical Engineering Department (Facultad de Ingeniería Química) at the Universidad Autónoma de Yucatán.  
January 1st, 1997 - December 31, 1998
William Patrick Arnott (patarnott@physics.unr.edu) Tel: 775-784-6834
Associate Professor of Physics, University of Nevada Reno Fax: 775-784-1398
Research Professor Desert Research Institute, Division of Atmospheric Sciences

Professional Preparation:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Year</th>
<th>Institution</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D.</td>
<td>1988</td>
<td>Washington State University, Pullman</td>
<td>Physics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Professor Philip L. Marston, Advisor)</td>
<td></td>
</tr>
<tr>
<td>M.S.</td>
<td>1986</td>
<td>Washington State University, Pullman</td>
<td>Physics</td>
</tr>
<tr>
<td>B.S.</td>
<td>1984</td>
<td>University of Southern Colorado, Pueblo</td>
<td>Physics</td>
</tr>
</tbody>
</table>

Appointments:

- 07/05-Present: Associate Professor, Physics Department, University of Nevada Reno.
- 07/05-Present: Director, Undergraduate Atmospheric Sciences Program, Physics Department, University of Nevada Reno.
- 2001-Present: Research Professor, Desert Research Institute, Division of Atmospheric Sciences, Reno, Nevada.
- 1996-2001: Associate Research Professor, Atmospheric Sciences Center, DRI.
- 1995-2002: Assistant Director, Atmospheric Sciences Program, Univ. of Nevada, Reno.
- 1992-1996: Assistant Research Professor, Atmospheric Sciences Center, DRI.
- 1991-Present: Adjunct Visiting Assistant Professor of Physics and Astronomy, Physics Department, University of Mississippi, Oxford.
- 1983: Research Assistant, University of Southern Colorado, Pueblo.

Synergistic Activities:

As director of the undergraduate atmospheric science program I take care of advising students, developing new courses, outreach and recruitment, and am the faculty advisor for the student chapter of the American Meteorological Society. I also teach courses in the Atmospheric Sciences Program and Physics Department at the University of Nevada, Reno. For example, my course in Atmospheric Radiation Transfer takes a hands-on approach. Students learn the theory of FTIR instruments, then use one to make measurements of the downwelling IR spectral radiance from 500 to 2000 1/cm. With this motivation, students develop a theoretical understanding, and numerical model, that seeks to explain their measurements. A simple 1-D model is developed and explored to understand multiple scattering. My undergraduate instrumentation course encourages and allows students to understand, use, and develop instruments for atmospheric science related measurements related to wind, atmospheric chemistry, and atmospheric radiation.

As a researcher, I develop and deploy photoacoustic instruments for measurement of black carbon emission from vehicles in source sampling, and in ambient air quality studies. These measurements are often combined with other real time particulate emission measurements for the larger purpose of establishing detailed knowledge of the conditions giving rise to most of the black carbon and particulate emission to the atmosphere, and their environmental impacts. Our latest initiative is associated with development of an all sky scanning spectral radiometer to characterize the solar spectrum, and to remotely sense properties of the atmosphere related to climate impacts such as cloud and aerosol optical depths.

Professional Activities:

Acoustical Society of America, Optical Society of America,
American Geophysical Union, Air and Waste Management Association

Summary

90 peer reviewed publications, 3 patents, mentored 3 Ph.D and 2 M.S. students, have 4 grad students. Principal Investigator on $3,200,000 research in the NSHE system, $609,000 at UNR. Licensed one invention for manufacture, photoacoustic instrument to Droplet Measurement Technology.
Publications (90 total). Since 1999:


Liu, Y, W. Patrick Arnott, and J. Hallett, 1999:  Particle size distribution retrieval from multispectral optical depth: Influences of particle nonsphericity and refractive index. J. Geophys. Res. 104 , 31,753-.


J. Hallett, W. P. Arnott, and M. Bailey, 2001:  Ice crystals in cirrus. [Collected Cirrus Works, edited by D. Lynch.].


Chakrabarty, R.K., H. Moosmüller, W. P. Arnott, M. A. Garro, G. Tian, J. G. Slowik, E. S. Cross, J. Han, P. Davidovits, T. B. Onasch, and D. R. Worsnop, (2009), Low Fractal Dimension Cluster-Dilute Soot Aggregates from a Premixed Flame. Physical Review Letters 102, 235504. See also the Physical Review Focus letter that accompanied the article.


W. P. Arnott's funding history as principal investigator on projects (almost complete).

<table>
<thead>
<tr>
<th>TITLE</th>
<th>AGENCY</th>
<th>AMOUNT</th>
<th>Start Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photoacoustic Measurements of Aerosol Light Absorption and Scattering during the DOE CARES Project, Roseville and Cool CA, 2010</td>
<td>DOE/Pacific Northwest National Laboratory</td>
<td>$28,045 (All UNR)</td>
<td>4/12/2010</td>
</tr>
<tr>
<td>Development of a compact photoacoustic instrument for aerosol light absorption and scattering for Lawrence Berkeley Laboratory: Complete system with enclosure and laser.</td>
<td>Lawrence Berkeley Laboratory via purchase order, sales and service.</td>
<td>$30,000 (All UNR)</td>
<td>8/13/2009</td>
</tr>
<tr>
<td>Development of a compact photoacoustic instrument for aerosol light absorption and scattering for Michigan Tech: Bare instrument with no laser or enclosure for use with a continuum laser.</td>
<td>Michigan Technological University via purchase order, sales and service.</td>
<td>$8,000 (All UNR)</td>
<td>9/9/2009</td>
</tr>
<tr>
<td>Laboratory Measurements of Optical Properties of Aerosol</td>
<td>DOE/Pacific Northwest Laboratory</td>
<td>$67,831</td>
<td>7/2/2009</td>
</tr>
<tr>
<td>SBIR Development of a compact photoacoustic instrument with scattering sensor for asymmetry parameter measurement</td>
<td>Subcontract from Droplet Measurement Technology, National Science Foundation SBIR program.</td>
<td>$30,000 (All UNR)</td>
<td>03/01/2009</td>
</tr>
<tr>
<td>Collaboration on Photoacoustic and Mass Spectrometer Measurements and Science</td>
<td>Subcontract from Aerodyne Inc, Department of Energy SBIR program.</td>
<td>$25,000 (All UNR)</td>
<td>03/01/2009</td>
</tr>
<tr>
<td>Development of a compact photoacoustic instrument for the Bay Area Air Quality Management District</td>
<td>Bay Area Air Quality Management District</td>
<td>$15,000 (All UNR)</td>
<td>02/01/2009</td>
</tr>
<tr>
<td>Development of 2 compact photoacoustic instruments for DRI</td>
<td>Desert Research Institute</td>
<td>$45,000 (All UNR)</td>
<td>07/04/2008</td>
</tr>
<tr>
<td>Aerosol Light Absorption</td>
<td>Department of Energy, Atmospheric Sciences Program, pass through of grant below to UNR</td>
<td>$108,257 (UNR Amount)</td>
<td>1/24/2008 (continuation to UNR of grant from DRI. Part of original $430,000 grant).</td>
</tr>
<tr>
<td>Estimate School Bus Pollution</td>
<td>Desert Research Institute</td>
<td>$11,950 (All UNR)</td>
<td>8/03/05-11/03/06</td>
</tr>
<tr>
<td>Collaborative Research: Aerosol Impacts on the Regional and Global Environment: MILAGRO Project, Mexico City.</td>
<td>National Science Foundation, Atmospheric Chemistry</td>
<td>$74,977 (All UNR)</td>
<td>10/01/2005 (UNR)</td>
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<tr>
<td>Project Description</td>
<td>Grantor</td>
<td>Amount</td>
<td>Start/End Dates</td>
</tr>
<tr>
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<tr>
<td>Development of an Instrument for Multispectral Measurement of Aerosol Light Absorption</td>
<td>National Science Foundation</td>
<td>$165,090 (UNR Amount)</td>
<td>9/01/2005 (continuation to UNR of grant from DRI. Part of the original $835,490 grant.)</td>
</tr>
<tr>
<td>Aerosol Light Absorption and Climate: Quantification by the Photoacoustic Method</td>
<td>Department of Energy Atmospheric Sciences Program (DRI)</td>
<td>$604,130</td>
<td>10/01/2004-1/31/2009</td>
</tr>
<tr>
<td>SGER: Photoacoustic Measurement of Aerosol Light Absorption for the Coastal Stratocumulus Imposed Perturbation Experiment</td>
<td>National Science Foundation</td>
<td>$54,931</td>
<td>8/01/2003 (DRI)</td>
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<tr>
<td>In Situ Aerosol Absorption Measurement Characterization Experiment</td>
<td>DOE - Pacific Northwest National Lab - Battelle Institute</td>
<td>$67,738</td>
<td>5/2/2002 - 5/2/2003</td>
</tr>
<tr>
<td>Development of an Instrument for Multispectral Measurement of Aerosol Light Absorption</td>
<td>National Science Foundation, Major Research Instrumentation</td>
<td>$835,490</td>
<td>8/15/2002 (Started at DRI, finished at UNR)</td>
</tr>
<tr>
<td>Delivery of a Photoacoustic Instrument at 532 nm and collaboration</td>
<td>Max Planck Institute for Chemistry</td>
<td>$67,995</td>
<td>11/1/2000 - 10/31/2001</td>
</tr>
<tr>
<td>Delivery of a Photoacoustic Instrument at 1047 nm and Collaboration</td>
<td>University of Utah</td>
<td>$35,446</td>
<td>8/1/2000 - 7/31/2001</td>
</tr>
<tr>
<td>Analysis of Anvil Cirrus from the 94 DOE/ARM IOP</td>
<td>University of North Dakota</td>
<td>$5,000</td>
<td>12/98-12/99</td>
</tr>
<tr>
<td>Effect of Evaporation-Condensation on Photoacoustics of Aerosols</td>
<td>Office of Naval Research</td>
<td>$27,343</td>
<td>7/1/99-6/20/00</td>
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<tr>
<td>Participation in Fall 97 DOE/ARM IOP Field Program in Ponca City, OK</td>
<td>Battelle Memorial Institute</td>
<td>$96,990</td>
<td>8/97-7/98</td>
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<td>Analytical Tools for Cloudscope Ice Measurements</td>
<td>NASA</td>
<td>$57,779</td>
<td>1/97-12/98</td>
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<tr>
<td>Advanced Methods to Measure Light Absorption by Aerosol</td>
<td>Environmental Protection Agency</td>
<td>$338,978</td>
<td>11/93-10/97</td>
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<tr>
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<tr>
<td>Analysis of Cirrus Cloud Microphysical Data and Anvil Cirrus Observation</td>
<td>Univ. North Dakota</td>
<td>$5,000</td>
<td>5/95-3/97</td>
</tr>
<tr>
<td>Automated Replicator DataAnalysis</td>
<td>NASA Langley</td>
<td>$115,036</td>
<td>9/93-6/95</td>
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<tr>
<td>Radial Wave Thermoacoustic Engines</td>
<td>Office of Naval Research</td>
<td>$150,000</td>
<td>9/93-9/96</td>
</tr>
<tr>
<td>Computer Modeling of Various Thermoacoustic Engines</td>
<td>Naval Postgraduate School</td>
<td>$13,000</td>
<td>3/93-9/93</td>
</tr>
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</table>

Arnott's CO PI Work (All when at DRI). THIS IS VERY INCOMPLETE!

<table>
<thead>
<tr>
<th>Title</th>
<th>Agency</th>
<th>Amount</th>
<th>Start Date</th>
</tr>
</thead>
</table>
Bruno S. Bauer  
University of Nevada, Reno  
Department of Physics / 220  
RENO NV 89557-0058  
775-784-1363; FAX: 775-784-1398  
bbauer@physics.unr.edu

EDUCATION

Ph.D. 1992 Physics University of California, Los Angeles  
Dissertation: Electron Plasma Wavebreaking and Caviton Formation

M.Sc. 1983 Physics University of California, Los Angeles

B.Sc. 1982 Mathematics Stanford University

PROFESSIONAL EXPERIENCE

2002-present  Associate Professor of Physics, University of Nevada, Reno

1996-2002  Assistant Professor of Physics, University of Nevada, Reno

1995-1996  Post Doctoral Researcher, Los Alamos National Laboratory


1982-1992  Research and Teaching Assistant, University of California, Los Angeles

RESEARCH

Plasma physics, high energy density physics, and applications; intensely driven matter for fusion energy and radiation sources.

HONORS

Invited Talk, Innovative Confinement Concepts Workshop, 2010

Invited Talk, DOE Workshop on Scientific Opportunities in High Energy Density Plasma Physics, 2008


Oscar Buneman Award for Best Still Image, 18th International Conference on Numerical Simulation of Plasma, with V.I. Sotnikov, J.N. Leboeuf, P. Hellinger, P. Travniecek, V. Fiala, 2003


Mousel-Feltner Award for Outstanding Research, UNR College of Arts and Science, 1998

U.S. Presidential Early Career Award for Scientists and Engineers, 1997

DOE-DP Young Scientist and Engineer Award, 1997

LANL Distinguished Achievement Award, 1996

LANL Director's Fellowship, 1995

LLNL Physics Award for Outstanding Postdoctoral Achievements, 1994


American Vacuum Society Award, 1985

UCLA Physics Dept. Excellence in Teaching Award, 1982-83

UCLA Graduate Student Research and Teaching Fellowship, 1982

HONORS OF ADVISED PHD STUDENTS

Thomas Awe, Invited Talk, Annual Meeting of the Division of Plasma Physics of the American Physical Society, 2010


PATENTS


PROFESSIONAL MEMBERSHIPS
RESEARCH PUBLICATIONS


RESEARCH PROPOSALS, GRANTS, AND CONTRACTS (Since 1999)

From 1996-2010 (at UNR), I participated in 71 proposals (61 as UNR PI or co-PI), yielding 47 awards (41 as UNR PI), granting $36,482,103 (including $23,116,484 for UNR, as UNR PI or co-PI):

Investigation of Dense Z-Pinches for Science-Based Stockpile Stewardship
Principal Investigator: Bruno Bauer
Agency: Sandia National Laboratories
Submitted: 4/03/98 Requested: $250,000 for 10/01/97 -- 9/30/02
Funding: $150,000 awarded to UNR for 10/01/97 -- 9/30/00 (and $300,000 to Rick Spielman of SNL to collaborate with UNR)

Investigation of High Energy Density Matter for Science-Based Stockpile Stewardship
Principal Investigator: Bruno Bauer
Submitted: 5/30/98 Requested: $5,196,149 for 7/01/98 -- 6/30/00
Funding: $2,250,000 awarded for 4/01/98 -- 6/30/99, including $2,225,000 to UNR-Bauer and $25,000 to UNLV-Farley

Nevada Cooperative Agreement for Research Infrastructure Support
Principal Investigator: Jane Nichols (participant Bruno Bauer)
Agency: National Science Foundation -- EPSCoR
Submitted: 7/15/98 Requested: $6,000,000 for 2/01/99 – 1/31/02
Funding: $6,000,000 to the UCCSN for 8/01/99-7/31/02, including $156,184 in equipment to UNR-Bauer

Extended charitable contribution for university laboratory development
Principal Investigator: Bruno Bauer
Agency: Tektronix Corporation
Submitted: 9/15/98 Requested: $55,000
Funding: $55,000 in scopes awarded to UNR as charitable contribution

Investigation of High Energy Density Matter for Science-Based Stockpile Stewardship – Supplementary Budget Request I
Principal Investigator: Bruno Bauer
Submitted: 12/01/98 Requested: $815,199 for 4/01/99 -- 6/30/99
Funding: $815,199 awarded for 4/01/99 -- 3/31/00, including $765,199 to UNR-Bauer and $50,000 to UNLV-Farley

Surplus Nova Equipment for High Energy Density Research
Principal Investigator: Bruno Bauer
Submitted: 3/15/99 Requested: $858,500 in Nova laser components
Funding: $858,500 in Nova laser components awarded

Shear-Flow-Stabilized Laser-Ignited Dense Z-Pinch for Fusion Propulsion
Principal Investigator: Friedwardt Winterberg; co-investigator Bruno Bauer
Agency: NASA -- Marshall Space Flight Center
Submitted: 4/16/99 Requested: $30,000 for 5/01/99 -- 4/30/00
Funding: $30,000 awarded to UNR for 4/01/00 -- 3/31/01

Experimental and Computational Studies of Major Physics Issues Concerning Wire-Array-Initiated Dense Z-Pinch Plasmas (Renewal)
Principal Investigator: David Hammer, Cornell University; co-investigators Bruno Bauer and Malcolm Haines (Imperial College)
Funding: $607,565 awarded to Cornell University for 11/16/99 -- 11/15/02; UNR subcontract: $33,000 for 11/16/99 -- 11/15/02.
Robust Radiography Device Issues and Studies for Stockpile Stewardship
Principal Investigator: Byard Wood, UNR, and Robert Schill, UNLV; co-investigator Bruno Bauer
Agency: U.S. Department of Energy -- EPSCoR
Submitted: 12/01/99
Requested: $1,639,709 for 7/01/00 -- 6/30/03, including $578,893 to UNR-Bauer
Funding: $1,639,709 for 7/01/00 -- 8/31/03, including $578,893 to UNR-Bauer

Investigation of High Energy Density Matter for Science-Based Stockpile Stewardship – Supplementary Budget Request II
Principal Investigator: Bruno Bauer
Submitted: 1/10/00 Requested: $2,062,500 for 4/01/98 -- 3/31/01
Funding: $960,000 awarded for 4/01/98 -- 3/31/01, including $910,000 awarded to UNR-Bauer and $50,000 to UNLV-Farley

Laboratory Simulation of Lightning and Dusty Plasmas
Principal Investigator: John Hallett, DRI; co-investigator Bruno Bauer
Agency: National Science Foundation -- EPSCoR
Submitted: 2/17/00 Requested: $624,020 for 7/01/00 -- 6/30/02
Funding: $624,020 for 8/15/00 -- 7/31/05, including $182,006 for UNR-Bauer

Investigation of High Energy Density Matter for Science-Based Stockpile Stewardship – Supplementary Budget Request III
Principal Investigator: Bruno Bauer
Submitted: 5/02/00 Requested: $1,062,500 for 4/01/98 -- 3/31/01
Funding: $1,062,500 awarded for 4/01/98 -- 3/31/01, including $1,012,500 awarded to UNR-Bauer and $50,000 to UNLV-Farley

International Collaboration to Develop NSF Proposal on Shear Flow Stabilization of Global MHD Instabilities in Z-pinch Plasma
Principal Investigator: Bruno Bauer
Agency: National Research Council
Submitted: 12/29/00 Requested: $7,600 for 6/01/01 -- 12/31/01
Funding: $7,600 awarded to UNR for 6/01/01 -- 12/31/01

Shear-Flow-Stabilized Laser-Ignited Dense Z-Pinch for Fusion Propulsion (Renewal)
Principal Investigator: Friedwardt Winterberg; co-investigator Bruno Bauer
Agency: NASA -- Marshall Space Flight Center
Submitted: 3/01/01 Requested: $60,000 for 4/01/01 -- 3/31/03
Funding: $27,000 awarded to UNR for 4/27/01 -- 4/26/03

Investigation of High Energy Density Matter for Science-Based Stockpile Stewardship – Supplementary Budget Request IV
Principal Investigator: Bruno Bauer
Submitted: 3/22/01 Requested: $575,520 for 4/01/98 -- 6/30/01
Funding: $575,520 awarded to UNR for 4/01/98 -- 6/30/01

NNSA/NV-UNR Stockpile Stewardship Cooperative Program in High Energy Density Science and Technology
Principal Investigator: Bruno Bauer
Submitted: 6/14/01 Requested: $12,500,000 for 7/01/01 -- 6/30/06
Funding: Cooperative Agreement created, year-by-year proposals to be considered

Principal Investigator: Bruno Bauer
The Petawatt Laser at the Nevada Terawatt Facility: A Petawatt Laser Transfer Plan
Principal Investigator: Bruno Bauer
Submitted: 7/23/01 Requested: $2,500,000 for 10/01/00 -- 6/30/04
Funding: $2,500,000 awarded to UNR for 7/31/02 -- 6/30/04 (with charges back to 10/01/00)

Principal Investigator: Bruno Bauer
Agency: Intel Corporation
Submitted: 12/11/01 Requested: $150,000 for 1/01/02 -- 12/31/03
Funding: $150,000 awarded to UNR for 1/01/02 -- 12/31/02

Development of a New Gas-Discharge EUV Lithography Source
Principal Investigator: Bruno Bauer
Agency: Applied Research Initiative
Submitted: 12/11/02 Requested: $50,000 for 1/01/02 -- 12/31/02
Funding: $50,000 awarded for 1/01/02 -- 6/30/06

The Leopard Laser: A High-Power, Short-Pulse, Ultra-Intense Laser for High Energy Density Science
Principal Investigator: Bruno Bauer
Submitted: 7/19/02 Requested: $2,500,000 for 7/01/02 -- 6/30/04
Funding: $2,447,000 awarded to UNR for 7/31/02 -- 6/30/04

Principal Investigator: Bruno Bauer
Submitted: 7/22/02 Requested: $2,500,000 for 7/01/02 -- 6/30/03
Funding: $2,500,000 awarded to UNR for 7/31/02 -- 6/30/03

Robust Radiography Device Issues and Studies (Continuation Proposal)
Principal Investigators: Byard Wood, UNR, and Robert Schill, UNLV; co-investigator Bruno Bauer
Agency: U.S. Department of Energy -- EPSCoR
Submitted: 12/23/02
Requested: $4,505,000 for 9/01/03 -- 8/31/06, including $2,057,972 to UNR-Bauer
Funding: $1,750,000 awarded for 9/01/03 -- 8/31/06, including $396,776 to UNR-Bauer

Magnetized Target Fusion Program Development
Principal Investigators: Bruno Bauer and Richard Siemon
Submitted: 3/01/03 Requested: $30,000 for 3/01/03 -- 9/30/03
Funding: $30,000 awarded to UNR for 5/09/03 -- 9/30/03

Characterization, Improvement, and Application of Radiation-Magnetohydrodynamic Computer Models for Gas-Discharge EUV Lithography Source Modeling
Principal Investigator: Bruno Bauer
Agency: Intel Corporation
Submitted: 3/01/03 Requested: $150,000 for 1/01/02 -- 12/31/03
Funding: $150,000 awarded to UNR for 1/01/02 -- 6/30/05

Initial Inverse z pinch experiment to study MTF-relevant wall confinement
   Retitled Spring 2005: Diffuse pinch experiment to study wall-plasma interactions and confinement
Principal Investigators: Bruno Bauer and Richard Siemon
Principal Investigator: Thomas Cowan; contributor Bruno Bauer
Submitted: 7/01/03 Requested: $2,500,000 for 7/01/03 -- 6/30/04
Funding: $2,500,000 awarded to UNR for 7/01/03 -- 6/30/04

Supplemental application to accelerate the project “Inverse z-pinch experiment to study MTF-relevant wall confinement”
Principal Investigators: Bruno Bauer and Richard Siemon
Submitted: 6/04/04 Requested: $14,000 for 8/01/04 -- 7/31/05
Funding: $14,000 awarded to UNR for 10/01/04 -- 2/14/08

Development of Radiation and Magnetohydrodynamic Computer Models for EUV Lithography Source Modeling
Principal Investigator: Bruno Bauer
Agency: Intel Corporation
Submitted: 8/04/04 Requested: $170,000 for 7/01/04 -- 12/31/05
Funding: $170,000 awarded to UNR for 7/01/04 -- 12/31/07

Supplemental application to accelerate the project “Diffuse pinch experiment to study wall-plasma interactions and confinement”
Principal Investigators: Bruno Bauer and Richard Siemon
Submitted: 4/22/05 Requested: $42,000 for 8/01/05 -- 7/31/06
Funding: $42,000 awarded to UNR for 10/01/05 -- 2/14/08

Toward the development of a novel gas-discharge EUV source for microlithography (ARI match to “Development of Radiation and Magnetohydrodynamic Computer Models for EUV Lithography Source Modeling”)
Principal Investigator: Bruno Bauer
Agency: Applied Research Initiative
Submitted: 6/10/05 Requested: $50,000 for 7/01/05 -- 12/31/06
Funding: $50,000 awarded for 7/01/05 -- 6/30/07

Radiation-magnetohydrodynamic evolution and instability of conductors driven by megagauss magnetic fields
Principal Investigators: Bruno Bauer and Richard Siemon
Submitted: 3/01/06 Requested: $990,000 for 7/01/06 -- 6/30/07
Funding: $930,000 awarded to UNR for 8/01/06 -- 7/31/08

Supplemental application to accelerate for 2006-2007 the project “Diffuse pinch experiment to study wall-plasma interactions and confinement”
Principal Investigators: Bruno Bauer and Richard Siemon
Submitted: 4/19/06 Requested: $70,000 for 8/01/06 -- 7/31/07
Funding: $70,000 awarded to UNR for 8/01/06 -- 2/14/08

Supplemental application to accelerate for 2007-2008 the project “Diffuse pinch experiment to study wall-plasma interactions and confinement”
Principal Investigators: Bruno Bauer and Richard Siemon
Submitted: 3/31/07 Requested: $32,000 for 7/01/07 -- 2/14/08
Funding: $32,000 awarded to UNR for 8/01/07 -- 2/14/08
Intense Magnetized Plasma-Wall Interaction
Principal Investigators: Bruno Bauer and Richard Siemon
Submitted: 8/15/07 Requested: $1,142,500 for 2/15/2008 – 2/14/12
Funding: $1,142,500 awarded to UNR for 2/15/08 -- 2/14/12

Single Shot Pulsed Power Development
Principal Investigators: Bruno Bauer
Submitted: 5/20/08 Requested: $250,000 for 6/01/08 – 5/31/09
Funding: $34,607 awarded to UNR for 7/16/08 -- 6/18/09

Computations in support of the HyperV plasma jet experiment
Principal Investigators: Bruno Bauer
Agency: HyperV Technologies Corp.
Submitted: 5/27/08 Requested: $20,000 for 6/01/08 – 9/30/08
Funding: $20,000 awarded to UNR for 10/01/08 -- 2/28/09

Theoretical Calculations for DPF Rod Pinch
Principal Investigators: Bruno Bauer and Volodymyr Makhin
Agency: National Security Technologies, LLC (NSTec)
Submitted: 6/23/08 Requested: $39,679 for 7/01/08 – 8/31/08
Funding: $39,679 awarded to UNR for 6/25/08 – 8/30/08

Formation of Imploding Plasma Liners for HEDP and MIF Applications
Principal Investigator: Jason T. Cassibry, U. of Alabama in Huntsville; Bruno Bauer collaborator
Submitted: 9/11/08
Requested: $989,000 for UAH, including $395,639 for UNR, for 3/01/2009 – 2/28/2013
Funding: $364,000 awarded to UAH for 2/01/10 -- 1/31/14

High Energy Research and Applications (HERA): MTF-FRC
Principal Investigator: Bruno Bauer
Submitted: 5/18/09 Requested: $199,996 for 7/01/09 – 6/30/10
Funding: $133,000 awarded to UNR for 5/21/09 -- 5/21/10

Supplemental Application for 2010-2012 for the Project “Intense Magnetized Plasma-Wall Interaction”
Principal Investigator: Bruno Bauer
Submitted: 2/16/10 Requested: $163,892 for 2/15/10 – 2/14/12
Funding: pending

High Energy Research and Applications (HERA): MTF-FRC (Year 2)
Principal Investigator: Bruno Bauer
Submitted: 9/01/10 Requested: $100,000 for 5/21/10 – 5/21/11
Funding: pending
TEACHING EXPERIENCE

PHYS 152 General Physics II (3 credits)
PHYS 180 Physics for Scientists and Engineers I (3 credits)
PHYS 181/202 Physics for Scientists and Engineers II (3 credits)
PHYS 181H Physics for Scientists and Engineers II, Honors (3 credits)
PHYS 203 Physics for Scientists and Engineers III( 3 credits)
PHYS 423/623 Advanced Laboratory Techniques (2 credits)
PHYS 423/623 Advanced Laboratory Techniques I (1 credit)
PHYS 424/624 Advanced Laboratory Techniques II (1 credit)
PHYS 427/627 Introduction to Plasma Physics (led creation of this 3-credit course)
PHYS 473 Electricity and Magnetism (4 credits)
PHYS 473/673 Electricity and Magnetism I (3 credits)
PHYS 474/674 Electricity and Magnetism II (3 credits)
PHYS 493/693 Special Problems (3 credits)
PHYS 497 Senior Thesis (3 credits)
PHYS 711 Electromagnetic Theory I (3 credits)
PHYS 712 Electromagnetic Theory II (3 credits)
PHYS 727 Plasma Theory (led creation of this 3-credit course)
PHYS 771C Advanced Topics in Plasma Physics (3 credits)
PHYS 790 Graduate Seminar (3 credits)
PHYS 792 Special Problems (3 credits)
PHYS 795 Comprehensive Examination (1 credit)
PHYS 797 Thesis (3 credits)
PHYS 799 Dissertation (1-24 credits)

I stimulate student learning using demonstrations, computer simulations, conceptual quizzes, Personal Response Systems, WebCampus online learning, and other modern materials.
CURRICULUM VITAE

Dr. Sean M. Casey

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Department of Chemistry
Univ. of Nevada, Reno
1664 N. Virginia St.
Reno, NV  89557-0216

Phone:  775-784-4133
Fax:  775-784-6804
Internet:  scasey@unr.edu

Personal Data
U.S. citizen, born 17 May 1966 in Wyandotte, MI

Higher Education
Univ. of Minnesota, Twin Cities, Ph.D. in Chemistry, 1993
State Univ. of New York - College at Purchase, B.S. in Chemistry, 1988, summa cum laude

Professional Appointments
Associate Professor, 7/03-present
Assistant Professor, 6/97-6/03
Department of Chemistry, Univ. of Nevada, Reno (UNR).

Postdoctoral Research Associate, 12/93-5/97
JILA, Univ. of Colorado, Boulder.  Prof. S.R. Leone, Mentor.
   In situ laser probing of molecular beam epitaxy.

Graduate Research Assistant and Teaching Assistant, 9/88-12/93
Department of Chemistry, Univ. of Minnesota, Twin Cities.  Prof. D.G. Leopold, Mentor.
   Laser photoelectron spectroscopy of gas-phase anions.

Teaching Assistant, 9/85-5/88
Department of Chemistry, State Univ. of New York - College at Purchase.

Summer Intern, 5/87-8/87
YWC, York Labs, Inc., Extractions Department, Whippany, New Jersey.

Memberships
American Chemical Society (ACS)
American Vacuum Society (AVS)
Sigma Xi

Awards and Fellowships since 1997
Undergraduate Advising Award, UNR, 2007
runner-up for Alan Bible Teaching Award, UNR, 2004
National Science Foundation (NSF) CAREER Award, 2001
Junior Faculty Research Award, UNR, 2001
Research Corporation Research Innovation Award, 1997
Teaching Assignments since 1997
Univ. of Nevada

CHEM 101  General Chemistry I  (Fall 2000-2002)
2000 evaluation: course 3.3 (question 9 on the Chemistry Dept. evaluation form),
   instructor 3.4 (overall, question 10), instructor 3.41 (individual traits,
   questions 1-8) (all evaluations out of 4.0)
2001 evaluation: course 3.4, instructor (overall) 3.8, instructor (traits) 3.61
2002 evaluation: course 3.6, instructor (overall) 3.7, instructor (traits) 3.67
CHEM 201  General Chemistry for Scientists and Engineers I  (Fall 2009, 2010)
2009 evaluation: course 3.7, instructor (overall) 4.0, instructor (traits) 3.76
2010 evaluation: pending
CHEM 354, 422  Physical Chemistry II  (Spring 2003, 2004)
2003 evaluation: course 3.5, instructor (overall) 3.6, instructor (traits) 3.59
2004 evaluation: course 3.2, instructor (overall) 3.8, instructor (traits) 3.66
CHEM 391, 392  Special Problems
CHEM 421  Physical Chemistry I  (Fall 2003-2006)
2003 evaluation: course 3.3, instructor (overall) 3.9, instructor (traits) 3.66
2004 evaluation: course 3.4, instructor (overall) 3.8, instructor (traits) 3.61
2005 evaluation: course 3.4, instructor (overall) 3.8, instructor (traits) 3.71
2006 evaluation: course 3.5, instructor (overall) 3.8, instructor (traits) 3.67
CHEM 425  Biophysical Chemistry  (Fall 2008)
2008 evaluation: course 3.1, instructor (overall) 3.5, instructor (traits) 3.54
1998 evaluation: course 3.3, instructor (overall) 3.8, instructor (traits) 3.56
1999 evaluation: course 3.7, instructor (overall) 3.7, instructor (traits) 3.86
2000 evaluation: course 3.7, instructor (overall) 3.8, instructor (traits) 3.77
2001 evaluation: course 3.8, instructor (overall) 4.0, instructor (traits) 3.93
2006 evaluation: course 3.4, instructor (overall) 3.8, instructor (traits) 3.73
2007 evaluation: course 3.8, instructor (overall) 3.9, instructor (traits) 3.81
2008 evaluation: course 4.0, instructor (overall) 4.0, instructor (traits) 3.95
2009 evaluation: course 3.8, instructor (overall) 4.0, instructor (traits) 3.84
2010 evaluation: not yet examined (by me)
CHEM 450/650  Advanced Physical Chemistry  (Fall 1997-1999)
1997 evaluation: course 3.7, instructor (overall) 3.8, instructor (traits) 3.89
1998 evaluation: course 3.1, instructor (overall) 3.9, instructor (traits) 3.64
1999 evaluation: course 3.1, instructor (overall) 3.3, instructor (traits) 3.64
CHEM 480/680, 490/690  Independent Study
F2004 evaluation: course 4.0, instructor (overall) 4.0, instructor (traits) 4.00
CHEM 495, 497  Senior Thesis I
CHEM 496, 498  Senior Thesis II
F2005 evaluation: course 4.0, instructor (overall) 4.0, instructor (traits) 4.00
CHEM 707  Instrument Practicum
F2004 evaluation: course 4.0, instructor (overall) 4.0, instructor (traits) 4.00
CHEM 751  Special Topics in Physical Chemistry  (Fall 2007)
F2007 evaluation: course 4.0, instructor (overall) 4.0, instructor (traits) 3.88
CHEM 788  Research Conference
CHEM 789  Graduate Seminar I
CHEM 790  Graduate Seminar II
CHEM 793  Independent Study
CHEM 794  Colloquium
CHEM 795 Comprehensive Examination
CHEM 797 Thesis
CHEM 799 Dissertation

Undergraduate Advisees
Yon S. Sohn, B.S., Chemistry/Materials Science and Engineering, 2006. Received M.S. in Engineering from UNR, 2008.
Dae Hyun Hahm, Chemistry major.

Graduate Advisory Committees
Chair
April J. Carman, Chemistry Ph.D. 2002. Currently a staff scientist at Pacific Northwest National Laboratory, Hanford, WA.
Mark (Yunfeng) Zhang, Chemistry M.S. 2008.
Nihan Aldis, Chemistry M.S. 2009.
Amila Jeewandara, Chemistry Ph.D. candidate, 2004-present
Lekh Adhikari, Chemistry Ph.D. candidate, 2006-present
Awanthi Kalahe-Hewage, Chemistry Ph.D. candidate, 2007-present

Departmental Member
Jordan Mantha, Ph.D. Chemistry, 2009
Radhika Nair, Ph.D. Chemistry, 2009
Cameron Hilton, Ph.D. Chemistry, 2008
Brady Janes, M.S. Chemistry, 2008
Jason Ormsby, Ph.D. Chemistry, 2008
Jian Wang, Ph.D. Chemistry, 2007
Jennifer Hellbley, Ph.D. Chemistry, 2006
Travis Carson, Ph.D. Chemistry, 2005
Renante Yson, Ph.D. Chemistry, 2005
James Barr, M.S. Chemistry, 2004
Jian Zhang, Ph.D. Chemistry, 2004
Mark Malwitz, Ph.D. Chemistry, 2003
Vilen Nestorov, Ph.D. Chemical Physics, 2002
Trina Ormonde, M.S. Chemistry, 2002
Edurne Erkizia, Ph.D. Chemistry, 2000
Radha Bohla, Chemistry Ph.D. candidate
Kathryn Caudle, Chemistry Ph.D. candidate
Raphael Enow, Chemistry Ph.D. candidate
Udaya Jayasundara, Chemistry Ph.D. candidate
Esmaeel Masadeh, Chemistry Ph.D. candidate
Ruth L. Viboh, Chemistry Ph.D. candidate
Jason Weedon, Chemistry Ph.D. candidate
At-Large Member
Kyle Beloy, Ph.D. Physics, 2009
Brian Chrisman, Ph.D. Physics, 2009
David Atherton, M.S. Physics, 2007
Miao Lu, Ph.D. Physics, 2006
Michael Dornoo, M.S. Math, 2003
Nicole Abbott, Biochemistry Ph.D. candidate
David Atherton, Physics Ph.D. candidate
Gunes Kaplan, Physics Ph.D. candidate
Yadab Paudel, Physics Ph.D. candidate
Josee-Anne Tousignant, Speech Pathology and Audiology M.S. candidate

Post-Doctoral Research Associates
Dr. Christopher P.A. Mulcahy (Ph.D., Imperial College, UK), May 1998 to July 1999, currently employed by Cascade Scientific, Uxbridge, UK
Dr. Linhu Zhang (Ph.D., Dalian Inst. for Chemical Physics, PRC), July 2000 to March 2003, currently employed by Western Univ. of Health Sciences, Pomona, CA

Grants Funded since 1997


"University of Nevada, Chemistry REU program," PI: Casey; co-PI: B.J. Frost (UNR Chemistry), NSF, $201,764. Department grant; Casey group share: $0 (0.5 month Casey salary); Mar. 15, 2006 to Feb. 28, 2010.


“An investigation of the initial stages of thin film growth of electronic materials employing mass-selected beams of neutral radicals,” Research Innovation Award, Research Corporation,

**Grant Proposals Pending**

“Tuning photocatalytic properties of monolayer capped metal nanoclusters,” PRF (Type “ND” Grant), ACS, $100,000., submitted Mar. 2010.

**Service since 1997**

**ACS**
- General Chair of 2006 Northwest Regional Meeting (in Reno, NV)
- Sierra Nevada Section Chair (2001)
- Sierra Nevada Section Program Chair (2000)
- Sierra Nevada Section Treasurer/Secretary (1999)

**Univ. of Nevada**
- Graduate Student Association Award judge (2010)
- Bible Teaching Award Committee member (2007, 2009, 2010)
- Faculty Senate Grievance Hearing Committee member (2008-2009)
- Nevada Undergraduate Research Symposium session chair (2008)
- Undergraduate Adviser Award review panel (2008)
- Undergraduate Research Award review panel (2003, 2006-2008)
- Performing Arts Series Board member (1998-2001)

**College of Science**
- LeMay Award Committee (2010)
- Shin Award Committee (2008)
- Department of Mathematics and Statistics Chair Search Committee (2006-2007)
- Interim Course and Curriculum Committee (2003-2004)
- Core Science Course Development Committee (2004)

**Department of Chemistry**
- Research Computing, chair (2010-present)
- Instructional Computing Coordinator (2003-2004, 2010-present)
- Instrumentation, chair (2009-2010)
- Alumni Relations and Development (2009-present)
- Publicity, Outreach, and Recruiting (2009-present)
- Scholarship Committee (2008-present)
- Chemistry Graduate Student Association faculty adviser (2006-present)
- Department Web Master (2006-present)
- Publicity and Alumni Relations Committee (2005-2009)
- Instructional Enhancement Grant (2008-2009)
- Physical/Analytical Faculty Search committee member (2008-2009)
- Organic Lecturer Search committee member (2006-2007)
- Laboratory Curriculum Committee (2000-2003)
Professional Service
reviewer for Chemical Physics Letters
reviewer for Surface Science
reviewer for the Journal of the American Chemical Society
reviewer for the Journal of Physical Chemistry
reviewer for the Journal of Vacuum Science and Technology
reviewer for the Journal of Chemical Physics
reviewer for Nuclear Instruments and Methods in Physics Research
reviewer for the Journal of Computational Chemistry
reviewer for the ACS, PRF
reviewer for the Environmental Inst. Center for Energy Research, Oklahoma State Univ.
reviewer for the NSF
NSF REU review panel member (2006, 2007)
reviewer for the U.S. Civilian Research and Development Foundation
reviewer for the Research Corporation
reviewer for the Army Research Office
reviewer for the Department of Energy, Office of Basic Energy Sciences
reviewer and question writer for the chemistry GRE exam (2003)
judge for the ACS for the Intel Science Fair (Reno, 2009)
judge for Washoe County Regional Science Fair
tenure and promotion packet review, Oklahoma State Univ.
assisted with Galena High School’s Mole Day Celebration

Professional Publications (since 1997)


**Papers Presented at Conferences (presenting author underlined) since 1997**


34. "Computational studies of the chemistry of the Si-rich β-SiC(100) surface," (contributed
Seminars and Colloquia since 1997

Department of Chemistry, Dickinson College, Carlisle, PA, Sept. 1999.
Department of Chemistry, Univ. of Missouri, St. Louis, MO, Feb. 2002.
Department of Chemistry, Univ. of Tulsa, Tulsa, OK, Feb. 2002.
Department of Chemistry, Augsburg College, Minneapolis, MN, Apr. 2002.
Department of Chemistry, Univ. of Wisconsin, Eau Claire, WI, Apr. 2002.
Department of Chemistry, Univ. of Minnesota, Minneapolis, MN, Apr. 2002.
Department of Chemistry and Biochemistry, Univ. of California, San Diego, CA, Apr. 2002.
Department of Chemistry, Univ. of Utah, Salt Lake City, UT, Apr. 2002.
Department of Chemistry, Univ. of California, Davis, CA, May 2002.
Department of Chemistry, Univ. of Nevada, Reno, NV, Sept. 2002.
Department of Chemistry and Biochemistry, Univ. of Delaware, Newark, DE, Mar. 2003.
Department of Chemistry and Biochemistry, Brigham Young Univ., Provo, UT, Nov. 2003.
"Special Topics in Chemistry," guest lecturer, Department of Chemistry, Univ. of Minnesota, Minneapolis, MN, Jan. 2005.
Department of Chemistry, Eastern Oregon University, La Grande, OR, Apr. 2006.
Department of Chemistry, Univ. of Nevada, Las Vegas, NV, Nov. 2006.
"Instrumental Analysis," guest lecturer, Department of Chemistry, University of the Puget Sound, Tacoma, WA, Sep. 2007.
Curriculum Vitae
Joseph I. Cline

1 Personal Data

Address Department of Chemistry/216 University of Nevada
Reno, NV 89557 USA
Telephone 775-784-4376
FAX 775-784-6804
Email cline@unr.edu
WWW http://www.chem.unr.edu/faculty/cline/

2 Education

Ph.D. Chemistry 1988 California Institute of Technology Advisor: Prof. K.C. Janda
B.S. Chemistry 1983 University of Virginia Awarded with highest distinction

3 Professional experience

Assistant Dean 2008–present College of Science, University of Nevada
Professor 2003–present Department of Chemistry, University of Nevada
Director 2001–2009 Chemical Physics Program, University of Nevada
Associate Professor 1996–present Department of Chemistry, University of Nevada
Assistant Professor 1990–1996 Department of Chemistry, University of Nevada
Postdoctoral Research Associate 1988–1990 JILA (National Institute of Standards and Technology and University of Colorado, Boulder)
Graduate Research Assistant 1983 – 1988 California Institute of Technology
Engineering Assistant 1982 – 1983 Fluorescent Engineering Department, General Electric Company, NELA Park, Cleveland, Ohio

4 Awards and honors

Regent’s Academic Advisor Award May 2003 University and Community
College System of Nevada
Sabbatical leave Spring 2000 University of Nevada
Senior Scholar Mentor 1996 University of Nevada Alumni
Association
Young Faculty Research Award 1990 University of Nevada
Sigma Xi President’s and Visitor’s Research Prize in the Natural Sciences and Mathematics 1987 University of Virginia
National Science Foundation Predoctoral Fellow 1983-1986 California Institute of Technology
Sigma Xi Anniversary Award in the Physical Sciences 1983 University of Virginia
Hugh Miller Spencer Scholarship Prize in Chemistry 1983 University of Virginia
Phi Beta Kappa 1982 University of Virginia

5 Publications


6 Lectures and seminars


34. Invited lecture: “Creation and detection of preferred senses of product rotation in bimolecular collisions”, NW Regional Meeting of the American Chemical Society, June 15, 2001, University of Seattle, Seattle, WA.


36. Invited lecture: “Chiral Molecular Dynamics”, Gordon Conference: Atomic and Molecular Interactions, July 8, 2002, Roger Williams University, Bristol, RI.

37. Invited seminar: “Creation and Detection of Preferred Senses of Molecular Rotation”, November 22, 2002, Department of Physics, University of Nevada, Reno.

38. Invited seminar: “Creation and detection of preferred senses of product rotation in bimolecular collisions”, February 7, 2003, Department of Chemistry and Department of Physics, University of Nevada, Las Vegas (Host: Prof. Balakrishnan Naduvalath).


42. Invited seminar: “Spectroscopic probing of light-driven molecular rotary actuators”, March 14, 2008, (Public Talk/Seminar), Department of Physics, University of Nevada, Reno.
7 Research students

7.1 Graduate students

Students listed in chronological order by graduation date:

1. Mark C. Wall (Graduate Student 1990-1995)
   B.S. 1990, California State University, Bakersfield
   Ph.D. Chemistry 1995, University of Nevada
   Postdoctoral Fellow 1995-1998, Boston University (Amy Mullin)
   Currently: Scientific Staff, Massachusetts Institute of Technology

2. Radoslaw Uberna (Graduate Student 1992-1996)
   Magister 1990, Jagellonian University
   Ph.D. Chemical Physics 1996, University of Nevada
   Postdoctoral Fellow 1996-1999, JILA, Univ. of Colorado (Steve Leone)
   Currently: Senior Scientist, Meadowlark Optics, Longmont, CO

3. Kazuhiko Fukui (Graduate Student 1992-1997)
   B.S. 1993, University of North Carolina, Asheville
   Ph.D. Chemical Physics 1997, University of Nevada
   Postdoctoral Fellow, Oak Ridge National Laboratory (Don Noid)
   Currently: Scientific Staff, The National Institute of Advanced Industrial Science and Technology (Tokyo)

4. Patrick J. Pisano (Graduate Student 1993-1998)
   B.S. 1993, Marquette University
   Ph.D. Chemical Physics 1998, University of Nevada
   Postdoctoral Fellow, Cornell University (Paul Houston)
   Currently: Engineering staff, Intel, Inc., Portland, OR

5. Julia Spasov (Graduate Student 1995-1999)
   M.S. 1994, Sofia University
   Ph.D. Chemical Physics 1999, University of Nevada
   Postdoctoral Fellow, Univ. of California, Berkeley (Brad Moore)
   Currently: Engineering staff, Coherent, Inc., Santa Clara, CA

6. Vilen Nestorov (Graduate student 1996-2002)
   M.S. 1992, Sofia University
   Ph.D. Chemical Physics 2002, University of Nevada
   Postdoctoral Fellow, University of California, Berkeley (Steve Leone)
   Currently: Scientific Staff, KLA Tencor, Milpitas, CA

7. James Barr (Graduate student 1999-2004)
   B.S. 1999, Freed-Hardeman University
   M.S. Chemistry 2004, University of Nevada
   Currently: Chemistry Faculty, Freed-Hardeman University

8. Jordan Mantha (Graduate student 2002-2009)
   B.S. 2002, University of Montana
Ph.D. Chemistry 2009, University of Nevada
Currently: Postdoctoral Fellow, Phillips Laboratory, Hanscom AFB

9. Stephanie Everhart (Graduate student 2003-2009)
   B.S. 2002, Azusa Pacific University
   Ph.D. 2009, University of Nevada (Chemical Physics)
   Currently: Postdoctoral Fellow, Wayne State University (Arthur Suits)

10. Ali Ismail (Graduate student 2005-2010)
    B.Sc. 1999, Hashemite University (Jordan)
    M.Sc. 2001, Jordan University (Jordan)
    Ph.D. Physical Chemistry 2010, University of Nevada
    Currently: Postdoctoral Fellow, Stanford University (Richard Zare)

11. Udaya Jayasundara (Graduate student 2006-present)
    B.S. 2004, University of Peradeniya (Sri Lanka)
    Graduate Student (Physical Chemistry)

7.2 Undergraduate thesis students

Students listed in chronological order by graduation date:

   B.S. 1993, University of Nevada (Chemistry)

   B.S. 1996, University of Nevada (Physics)
   M.D. 2000, University of Nevada, Reno

3. Patrick Kano (Undergraduate Researcher 1998)
   B.S. 1998, University of Nevada (Physics)

   B.S. 2000, University of Nevada (Chemical Engineering)
   Ph.D. 2006, University of Colorado

5. George Barnes (Undergraduate Researcher 2000-2003)
   B.S. 2003 (Chemistry with Honors)
   Ph.D. 2008, University of Wisconsin


8 Research Funding

Funding since last Chemical Physics Program Review.


• “Angular momentum pressure molecular motor”, National Science Foundation, $99,636 (50% JIC), 5/15/03-4/30/04, co-PI K. M. Ervin.

• “Desorption/Mercury Vapor Detection”, Nevada Nanotech Systems, Inc. (with NSHE-ARI match), $20,000 (50% JIC), 7/1/05-12/31/06, co-PI M. N. Nicolescu.

• “NA-22: Surface Absorption Polarization Sensors (SAPS)”, Department of Energy, $475,000 ($200,000 JIC), 9/30/05-3/31/08, co-PIs T. W. Bell and C. R. Cremo.

• “NA-22: Chemical Vapor Detection System”, Department of Energy, $100,000 ($4,800 JIC), 9/30/05-3/31/07, co-PIs M. N. Nicolescu and E. A. Marchand.
Andrei Derevianko  
Physics Department, University of Nevada, Reno, NV 89557, USA  
(775) 784-6039 (office)  (775) 784-1398 (fax)  
andrei@unr.edu  http://wolfweb.unr.edu/homepage/andrei/tap.html

EXPERIENCE

Professor  July 2010–present
University of Nevada, Reno

Associate Professor  July 2006–June 2010
University of Nevada, Reno

Assistant Professor  Jan. 2001–June 2006
University of Nevada, Reno

Postdoctoral Research Associate  
Harvard-Smithsonian Center for Astrophysics/Institute for Theoretical Atomic Physics (with A. Dalgarno)  1999–2000

Postdoctoral Research Associate  1996–1999
University of Notre Dame (with W.R. Johnson)

EDUCATION

Doctorate of Philosophy in Physics  1996
Auburn University

Master of Science in Physics and Applied Mathematics summa cum laude  1992
Moscow Institute of Physics and Technology (FizTech)

AWARDS

Fellow of the American Physical Society  2008
American Physical Society  
Citation: For elucidating the role of the Breit interaction in atomic parity non-conservation, demonstrating the importance of higher-order non-dipole corrections in low-energy photoionization, and for pioneering calculations of higher-order many-body corrections to atomic energies and matrix elements.

Fulbright scholarship to Australia  2007
U.S. Department of State

Mousel-Feltner award for excellence in research/creative activity  2006
University of Nevada

Precision measurement grant  2003
U.S. National Institute of Standards and Technology Department of Commerce

Graduate student award for promise in research  1995
Auburn University

MEDIA COVERAGE

De simples atomes de césium peuvent-ils battre le LHC ?  
Futura-Sciences (France), May 2009

Atomic physics study sets new limits on hypothetical new particles  
Время в лазерной ловушке (Time in a laser trap)  
Вокруг Света (Russia) magazine, May 2009 issue

Outsmarting particle colliders by John Trent  
Nevada News, April 2009

Time to shrink the atomic clock by Anil Ananthaswamy  
New Scientist magazine, March 14, 2009 issue

Portable precision: A new type of atomic clock  
American Physical Society

Changing the clocks, and it's about time  
the Australian
Atomic clock can shrink by 'magic' by Bob Beale
University of New South Wales, Australia

Why aluminum should replace cesium as the standard of time
physics arXiv blog

Philip Ball asks if you can spare him 429 228 004 229 952 oscillations of your time
Chemistry World magazine, October 2008

An accurate clock arrives at last
The Inquirer (British tabloid)

Researcher creates world's most accurate atomic clock by John Trent
Nevada News

Quicksilver clock could 'revolutionize' physics
Discovery Channel News

Fulbrights offer unique experiences to faculty and grads by Zanny Marsh
Nevada News

His team changed the world's time
Silver and Blue magazine, Winter 2007

Американские ученые поправили самые точные часы (American scientist corrected the most accurate clock)
Lenta.ru (Russia)

L'horloge atomique craint la chaleur... (Atomic clocks "fear" heat) by Pascal Belotti
Futura Sciences (France)

Interview with KOH radio

Interview with News 4 (greater Reno area NBC affiliate)

Physicists make atomic clock breakthrough by Ben Hoffman
Nevada News

Atomic clocks feel the heat by Belle Dume
Physics World magazine, September 2006 issue

PATENTS

Microwave frequency optical lattice clock
K. Beloy, A. Derevianko, V. A. Dzuba, and V. V. Flambaum
patent application was filed in Australia (2008)

PUBLICATIONS

- About 100 publications (including 17 Physical Review Letters and 12 rapid communications in Physical Review)
- Total number of citations: more than 1,600
- In 2009 my papers have been cited about 250 times.
- H-index: 26

NOTABLE PUBLICATIONS


Atomic parity violation (APV) places powerful constraints on new physics beyond the Standard Model of elementary particles. In the 2000 paper, I have resolved one of the largest observed deviations from the Standard Model. This well-cited paper has initiated world-wide efforts on understanding QED corrections to APV. In the 2009 paper, my group reported the most accurate to-date determination of the electroweak coupling between electrons and quarks. Our work confirmed the predicted energy dependence (or "running") of the electroweak interaction over an energy range from 10 MeV to 100 GeV. Our theoretical efforts placed new limits on the masses of yet undiscovered extra Z bosons, carving out the lower-energy part of the discovery reach of a dedicated search at the Large Hadron Collider (next-generation multi-billion-dollar accelerator).

Modern time-keeping, navigation, and digital networks rely on atomic clocks. In a series of papers, starting with this well-cited 2004 paper, we contributed to developing a novel class of optical atomic clocks. These clocks employ ultracold atoms trapped in standing waves of laser light (optical lattices) operating at a specially chosen “magic” wavelength. Our proposals for atomic clocks based on Yb and Hg atoms motivated experimental efforts at several laboratories, including two world leaders in time keeping: the US National Institute of Technology and the Paris observatory. The accuracies are astonishing: these clocks are projected to lose only a fraction of the second over the age of the Universe. Very recently, these clocks surpassed the best Cs primary frequency standards (they define the second, the unit of time) in terms of the accuracy.


In this paper, we proposed a new class of atomic clocks ("microMagic clocks"). Current primary frequency standards have an essential element: large fridge-sized vacuum chambers. We found special conditions, where the size of the active element can be reduced to a micrometer-sized region using "magic" optical lattices. At the same time these clocks would operate in a convenient microwave domain (unlike optical clocks), removing the need for one of the expensive part of an optical clock, the so-called frequency comb. Due to their small size, these clocks may be suitable for satellite-based space laboratories.


In the 1990s, understanding interactions of atoms in then nascent ultra-cold regime required high-accuracy characterization of long-range interactions between collision partners. In this well-cited paper, we improved the accuracy of describing the van der Waals interaction between heavy alkalis by roughly a factor of a 100 over previous determinations. Our theoretical predictions have been confirmed in a number of cold-atom experiments and the tabulated van der Waals coefficients for diatomic molecules have proven to be influential in the field of cold collisions.


Photoionization is a long-established area of research. Genuine surprises are rare. An earlier measurement of angular distributions of photoelectrons at Berkeley markedly disagreed with predictions of conventional theoretical approaches. In this well-cited paper we explained the surprising disagreement, showing that the usually-neglected non-dipole contributions play a prominent role. Since the publication, this unconventional mechanism has been found to be important in a number of experiments.

REVIEWS

REGULAR REFEREEED ARTICLES


26. Hyperfine structure of the metastable $^3P_2$ state of alkaline-earth atoms as an accurate


44. Possibility of an ultra-precise optical clock using the $^6\, ^1S_0\rightarrow^6\, ^3P_0$ transition in $^{171,173}$Yb atoms held in an optical lattice, S. G. Porsev, A. Derevianko, and E. N. Fortson, rapid communication, Phys. Rev. A 69, 021403(R) (2004).


50. Observation of nuclear magnetic octupole moment of $^{133}$Cs, V. Gerginov, A. Derevianko and


OTHER PUBLICATIONS


94. Role of Negative-energy States and Breit Interaction in Calculations of Atomic Parity-nonconserving Amplitudes, A. Derevianko, (physics/0001046)


ANDREI DEREVIANKO


**INVITED TALKS**

1. **Improved test of the standard model of elementary particles with atomic parity violation**, workshop on variation of fundamental constants and violation of fundamental symmetries, Cairns, Australia, July 24, 2010

2. **Precision determination of electroweak coupling from atomic parity violation and implications for particle physics**, workshop on Fundamental constants and precision measurements, Dubna, Russia, Dec. 2, 2009

3. **Ultracold, precise, and electroweak**, AMO seminar, University of California, Berkeley, November 12, 2009

4. **Listening to an atom**, physics lunch seminar, University of California, Berkeley, November 12, 2009


7. **Ultracold, precise, and electroweak**, colloquium, University of Nevada, Reno, Nevada, Apr. 24, 2009

8. **Improved test of the Standard Model with parity violation in atomic cesium**, Joint Atomic Physics Colloquium, Harvard University/ITAMP, March 18, 2009


10. **Improved test of the Standard Model with parity violation in atomic cesium**, seminar, KVI, Groningen, the Netherlands, Jan. 15, 2009

11. **Ultracold, precise, and electroweak**, Keck seminar, Rice University, Houston, Texas, November 24, 2008

12. **Improved test of the low-energy electroweak sector of the Standard Model with parity violation in atomic cesium**, talk at the workshop on low energy precision electroweak physics in the LHC era, Institute for Nuclear Theory, Seattle, November 10, 2008

13. **Ultracold, precise, and electroweak**, AMO seminar, University of Texas, Austin, Texas, October 24, 2008

14. **CP-violating magnetic moments of atoms and molecules**, colloquium, University of Toledo, Toledo, Ohio, August 29, 2008

15. **Convergence of all-order many-body methods: coupled-cluster study for Li**, talk at the workshop on Atomic, Chemical and Nuclear Developments in Coupled Cluster Methods, Institute for Nuclear Theory, Seattle, July 17, 2008

16. **CP-violating magnetic moments of atoms and molecules**, colloquium, University of New South Wales, Sydney, Australia, May 6, 2008

17. **Black body radiation shift in Cs and optical lattice clocks**, seminar at University of Tokyo, Tokyo, Japan, Apr 9, 2008


20. **Tests of fundamental symmetries with atoms and molecules**, colloquium at Dipartimento di
25. **Theoretical overview of atomic parity violation**, seminar, University of Maryland, College Park, Maryland, July 25, 2007
26. **Bose-Einstein condensates of polar molecules: anisotropic interactions = anisotropic mass**, QIBEC seminar, July 18, 2007, NIST, Gaithersburg, MD
27. **Atomic and molecular CP-violating magnetic moments**, AMO seminar, University of California, Berkeley, CA, Apr 25, 2007
29. **Atomic and molecular CP-violating magnetic moments**, invited talk at the Institute for Nuclear Theory workshop on EDMs and CP-violation, U. Washington, Seattle, WA
30. **Atomic and molecular CP-violating magnetic moments**, AMO seminar, Feb 5, 2007, University of Delaware, DL
32. **Atomic and molecular CP-violating magnetic moments**, seminar, JILA, Nov. 14, 2006 Boulder, CO
33. **Black-body radiation shift in Cs and optical lattice clocks**, Time and Frequency Division seminar, Nov. 13, 2006, NIST-Boulder, CO
38. **Atomic parity and CP violation and impact on the particle physics**, seminar, Ohio State University, Columbus, OH, March 30, 2005.
42. **Atomic searches for new physics beyond the standard model**, seminar, Yale University, Jan. 5, 2005.
44. **Searches for new physics beyond the standard model with atoms and molecules**, colloquium, Georgia Institute of Technology, Atlanta, September 22, 2004.
48. **How to derive and compute 2,400 diagrams**, Atomic Physics Seminar, Notre Dame University,


51. **Prospects for Bose condensates with metastable alkaline-earth atoms**, seminar, Atomic Physics Division, NIST, Gaithersburg, Sept. 12, 2002


55. **Ab initio relativistic many-body calculations: parity violation and long-range atom-atom interactions**, Chemistry Department seminar, Princeton University, Dec 19, 2000


59. **Hot, Cold, and Electroweak**, Physics Colloquium, University of Nevada, Reno, Apr. 26, 2000

60. **Atomic parity-nonconservation as a test of 'new physics': towards 0.1% precision**, Colloquium, Michigan Technological University, Feb. 17, 2000


GRANT RELATED ACTIVITIES

1. **Nevada Astrophysics**, National Aeronautics and Space Administration ("umbrella" grant), $1,500,000 shared between University of Nevada-Reno and University of Nevada-Las Vegas; 01/01/2008 -- 01/01/2011. Co-PI.

2. **Tests of Fundamental Symmetries with Atoms and Molecules**, National Science Foundation, $269,735; 09/01/2007 - 09/01/2010. PI

3. **Atomic Many-Body Theory with Applications**, National Science Foundation, $180,000; 09/01/2004 - 09/01/2007. PI

4. **Next-Generation High-Precision Calculations of Atomic Parity Violation**, National Institute of Standards and Technology, Precision Measurement Grants, $150,000; 09/01/2003 - 09/01/2006. PI

5. **Atomic Many-Body Formalisms and High Precision Data for Ultracold Collision Studies**, National Science Foundation, $150,000; 09/01/2001 - 09/01/2004. PI

6. **Theoretical Studies at the Interface of Atomic and Nuclear Physics**, Junior Faculty Research Grant, University of Nevada, Reno, $10,000; 07/01/2001 - 07/01/2002. PI

7. Various minor grants from the University and Nevada-EPSCoR program (such as travel grants and support for undergraduate students)

PROFESSIONAL SERVICE

- Member of the fellowship committee, APS Topical Group on Precision Measurements and Fundamental Constants
- Refereed papers in various research journals, such as Physical Review Letters, Physical Review A and D, Journal of Physics B, Physica Scripta, Atomic Data and Nuclear Data Tables, European Journal of Physics, European Physics Letters, Transactions on Ultrasonics, Ferroelectrics, and Frequency Control
- Reviewed proposals for Department of Energy, National Science Foundation (Atomic Theory and
ANDREI DEREVIANKO

Chemistry), SHARCNET (Canada), NSERC (Canada)
- Participated in the NSF atomic theory panel
- Nevada Undergraduate Research Opportunity Program (NSF EPSCOR UROP). Reviewed about 70 student applications from UNLV and UNR and participated in review panels, 2006, 2008
- Refereed 2 books for World Scientific

UNIVERSITY/DEPARTMENTAL SERVICE
- Mousel-Feltner award committee (College of Science and College of Arts), 2007
- Organizing visit of Dr. Carl Wieman (sponsored by the College of Science), 2005
- Director of graduate studies in Physics, 2004-2007
- Personnel committee, 2004-2005
- By-laws committee, 2006, 2009
- Graduate curriculum committee, 2008-2009
- Colloquia series organizer, 2001 – 2003
- Computer committee/Chair of the committee, 2001-2003

TEACHING ACTIVITIES
I was responsible for teaching and developing the following classes

- PHYS 453/653 “Special and General Theory of Relativity”, F08
- PHYS 761 “Atomic and Molecular Physics”, S01, F02, F04
- PHYS 421/621 “Quantum Mechanics”, S05, S06, S07
- PHYS 422/622 “Applications of Quantum Mechanics”, F05, F06
- PHYS 473 “Electricity And Magnetism”, S09, S10
- PHYS 721 “Quantum Theory I”, F01, F03
- PHYS 722 “Quantum Theory II”, S02, S03, S04
- PHYS 790 Graduate Seminar
- PHYS 792 Special problems in atomic physics
- PHYS 497 Senior thesis credits
- PHYS 799 Ph.D. thesis credits

STUDENT INVOLVEMENT INTO RESEARCH

PH.D. STUDENTS
- Rishi Pandit, Ph.D. student, 2009-present
- Mahmoud Ahmed, Ph.D. student, 2009-present
- Dambar Air, Ph.D. student, 2010-present
- Heman Gharibnejad, Ph.D. student, 2010-present
- Kyle Beloy, Ph.D. thesis, 2005-2009. He was recognized as the outstanding graduate researcher (2nd place) by the University of Nevada. Now a postdoctoral fellow at the Institute of Advanced Studies, Massey University, New Zealand
- Boris Ravaine, Ph.D. thesis, graduated in 2007, now a National Research Council postdoc at the army research center in Alabama
- Erik Emmons, Ph.D. student, 2001-2002
- David Atherton, Ph.D. student, 2005

M.S. STUDENTS
- Caleb Cannon, M.S. thesis, graduated in 2007, founded a software company Lake Street Scientific

UNDERGRADUATE STUDENTS
- Muir Morrison, 2010-present
- Frank Greenhalgh, 2010-present
- Justin Luria, undergraduate thesis (honors), graduated in 2006, now a graduate student at Department of Physics, Cornell University
- Kiatichart Chartkunchand, undergraduate thesis (honors), graduated in 2006, now a graduate student at UNR
- Caleb Cannon, undergraduate thesis, graduated May 2003, continued as a graduate student at UNR

POSTDOCTORAL ASSOCIATES
- Dr. Boyan Obreshkov, postdoctoral associate, 2008-2009
- Dr. Sergey Porsev, postdoctoral associate/visiting scientist, 2001-2008. Now a research scientist at University of
EXTENDED COLLABORATIVE VISITS

- Centre National de la Recherche Scientifique invitee, Laboratoire Aimé Cotton, Orsay, France. Sept.-Dec, 2007
- National Institute of Standards and Technology, Gaithersburg, MD, July 2007
- Center for Theoretical Physics, University of Michigan, Ann Arbor, MI, Aug. 2005
- Institute for Theoretical Atomic & Molecular Physics, Harvard-Smithsonian, Cambridge, MA, Jan. 2005
- Institute for Nuclear Physics, University of Washington, Seattle, WA, Sept. 2002
- National Institute of Standards and Technology, Gaithersburg, MD, Sept. 2002
- University of Notre Dame, South Bend, IN, Mar. 2002
- Institute for Theoretical Atomic & Molecular Physics, Harvard-Smithsonian, Cambridge, MA, Oct. 1999
CURRICULUM VITAE

Dr. Kent M. Ervin

Contact Information

Department of Chemistry /216  Phone: 775-784-6676
University of Nevada, Reno  Fax: 775-784-6804
Reno, NV  89557  E-mail: ervin@unr.edu

Higher Education

University of California, Berkeley, Ph.D. in Chemistry (1986)

University of Kansas, Lawrence, B.S. in Chemistry and B.A. in German (1981),
Graduation with Highest Distinction

Friedrich-Alexander-Universität zu Erlangen-Nürnberg, Erlangen, Germany (1978–79)

Professional Appointments

Department of Chemistry and Chemical Physics Program, University of Nevada, Reno.
  Foundation Professor (2009-2012)
  Professor (7/1999–present)
  Chair (7/2003–6/2007)
  Associate Professor (7/1995–6/1999)
  Assistant Professor (8/1990–6/1995)

Joint Institute for Laboratory Astrophysics and Department of Chemistry and Biochemistry, University of Colorado, Boulder.

Department of Chemistry, University of California, Berkeley.
  Graduate Research Assistant and Teaching Assistant (9/1981–11/1986)

Phillips Petroleum, Analytical Division, X-Ray Fluorescence Laboratory, Bartlesville, Oklahoma.

Argonne National Laboratory, Chemical Engineering Division, Argonne, Illinois.

Nuclear Research Centre Jülich, Institute for Applied Physical Chemistry, Jülich, Germany.
  Research Intern (8/1979–11/1979)

Memberships

  American Chemical Society
    Division of Physical Chemistry
  American Society for Mass Spectrometry
Awards and Fellowships

Mousel-Feltner Award for Excellence in Research and/or Creative Activity, College of Arts and Science, University of Nevada, Runner-up (1999)
Junior Faculty Research Award, University of Nevada (1991)
Procter and Gamble Award, American Chemical Society (1984)
University of Kansas
  W. Otto National Merit Scholar (1975–81)
  Summerfield Scholar (1975–81)
  Alpha Chi Sigma Award, outstanding senior in Chemistry (1981)
  Awards for Excellence in Analytical Chemistry (1978) and General Chemistry (1976)
  Summer Language Institute, Holzkirchen, Germany (1976)
  John Curry Battenfeld Award, outstanding resident of Battenfeld Hall (1977–78)
  Phi Beta Kappa (1978)
  Paul Lawson Award, highest academic record as junior (1978)
Rotary Foundation International Fellowship (1978–79)

Teaching Assignments

University of Nevada
  CHEM 101 General Chemistry I (Spring 1998)
  CHEM 201H General Chemistry for Scientists and Engineers I Honors (Fall 2004)
  CHEM 480 Independent Study
  CHEM 497 Senior Thesis I
  CHEM 498 Senior Thesis II
  CHEM 680 Independent Study
  CHEM 707 Instrument Practicum
  CHEM 788 Research Conference
  CHEM 793 Independent Study
  CHEM 795 Comprehensive Exam
  CHEM 797 Thesis
  CHEM 799 Dissertation

University of California, Berkeley
Undergraduate Research Students

Marek Hajek (summer 1993)
Moon A. Su, senior thesis (1997)
Ovete Villavicencio, REU (summer 1997)
Sandra Garcia, REU (summer 1999)
Brian Hoyt (summer 2001)
Kathleen Altmiller, REU (summer 2008)
Nathan Roysden (summer 2010)

High School Intern
Lisa Rosini (summer 2005)

Graduate Students

Xiaoli Ren, M.S. in Chemistry (1992), “Flow tube reactions of metal cluster anions”
Taek-Hong Lee, Ph.D. in Chemistry (1995), “Reactions and bond dissociation energies of bare and ligated copper group cluster anions”
Katarzyna Rempala, M.S. in Chemistry (1999), “Investigations of hydrogen atom abstraction reaction of the sulfur radical anion with hydrocarbons”
Vincent F. DeTuri, Ph.D. in Chemical Physics (1999), “Gas-phase proton transfer reactions: Energetics and dynamics”
Moses K. Dogbevia, Ph.D. in Chemical Physics (2005), “Gas phase transition metal-cluster catalysis”
Nicholas A. Sassin, Ph.D. in Chemical Physics (2008), “Photodissociation and fluorescence of ions in a quadrupole ion trap”
Beni A. Dangi, Ph.D. in Chemistry, candidate (2006–present)
Alex Nickel, M.S. in Chemistry, candidate (2007–present)
Jerry G. Lanorio, Ph.D. in Chemistry, candidate (2008–present)

Post-Doctoral Research Associates

Dr. Alexander Grushow, Ph.D., University of Minnesota, (1994–1996)
Dr. Yang Shi, Ph.D., Academy of Sciences, Beijing (1997–2000)
Dr. Laurence A. Angel, Ph.D., University of Sussex (1999–2006)
Dr. F. Ahu Akin, Ph.D., University of Illinois, Chicago (2003–2005)
Dr. Beike Jia, Ph.D., Rice University (2005–2007)
**Current Grants**


**Service**

**Department of Chemistry**
- Graduate Recruiting and Admissions Committee (1990–91)
- Physical Chemistry Seminar Chair (1991–92, 1995–97)
- Library Committee (Member 1992–93, Coordinator 1993–99)
- Course and Curriculum Committee (member 1993–95, chair 1995–99)
  - Machine Shop Committee, Chemistry Department representative (1990–95)
- Graduate Study Committee (1995–96, 2000–1)
- Undergraduate Study Committee (2000–01)
- Associate Interim Chair (2001–3)
- Chair (2003–7)
- Curriculum and Assessment Committee (2008–9)
- Analytical/Physical Chemistry Faculty Search Committee Chair (2008–9)

**College of Arts and Sciences**
- Courses and Curricula Committee (member 1992–93, chair 1994–95)
- Personnel Review Committee (acting member Spring 1997, member 1997–98)

**College of Science**
- Planning Committee (2003–5)
- Search Committee, Budget and Personnel Officer (2005)
- Search Committee, Mining Engineering Faculty Position (2006)
- Search Committee, Director of Mackay School of Earth Science and Engineering (2005–6)
- Chairs and Directors Council (2004–7)
- Shin Research Award Selection Committee (2005, 2006)

**University**
- University Courses and Curricula Committee (1994–95)
- Mathematics Core Curriculum Committee (1993–95)
- Special Hearing Committee (1994–95)
- University Appeals Committee (1997–99)
- New Chair Orientation Workshop, Panel Member (August 15, 2005)
- Rhodes Scholar Mock Interview Team Member (September 2005)
- Academic Faculty Evaluation Workshop, Panel Member (November 7, 2005)
- Salary & Benefits Committee, Faculty Senate (chair 2005–7)
- Academic Compensation Committee (2006–7)
- Search Committee Chair, Director of Environmental Health & Safety (2007)
UNR Summer Undergraduate Research Poster Session, Judge (August 13, 2008)

**NSHE**
Project Director, Chemical Physics Cluster, Nevada NSF/EPSCoR Program,
Jul. 1, 1995–Aug. 31, 1999, $518,000 annual budget supporting Chemical Physics Programs
at UNR and UNLV (eleven target faculty in the departments of physics and chemistry at the
two campuses).
Retirement Plan Advisory Committee, UNR faculty representative (2006–present)

**Professional**
Chair, Sierra Nevada Section of the American Chemical Society (1997)
Secretary-Treasurer, Sierra Nevada Section of the American Chemical Society (1998)
Alternate Councilor, Sierra Nevada Section of the American Chemical Society (1994–96)
Scientific Reviewer for *Chemical Physics, Chemical Physics Letters, International Journal of
Education, Proceedings of the National Academy of Sciences, National Science Foundation,
Department of Energy, Petroleum Research Fund, National Aeronautics and Space
Administration, U.S. Civilian Research & Development Foundation
DOE Site Review Team, Metal Cluster Group, Argonne National Laboratory, DOE, Argonne, IL,
National Science Foundation, Chemistry Research Instrumentation and Facilities, Review Panel
(October 2003)
National Science Foundation, Major Research Instrumentation, Review Panel (March 2008)
Program Chair, Sierra Nevada Section of the American Chemical Society (2010)

**Community/Regional**
Western Region Science Fair, 6th grade judging team leader (2005)
Intel International Science Fair, Reno, Nevada, judge (2009)

**Ph.D. Thesis**
“Kinetic Energy Dependence of the Reactions of C+, N+, and Atomic Rare Gas Ions with H2, D2, and
HD”, Department of Chemistry, University of California, Berkeley, November 1986.

**Peer-Reviewed Publications** (Since 1999)

46. “Dynamics of endoergic bimolecular proton transfer reactions.F- + ROH 6 HF + RO! (R = H, CH3,
CH3CH2, (CH3)2CH, and (CH3)3C)”, V. F. DeTuri, M. A. Su, and K. M. Ervin, J. Phys. Chem. A. 103,


76. “Photodissociation and collisional cooling of rhodamine 575 cations.”, N. A. Sassin, S. C. Everhart, J.

77. “Statistical rate theory and kinetic energy-resolved ion chemistry: Theory and applications”
(Centennial Feature Article), P. B. Armentrout, K. M. Ervin, and M. T. Rodgers *J. Phys. Chem. A*,

78. “Fluorescence and photodissociation of rhodamine 575 cations in a quadrupole ion trap”, N.A. Sassin,
(2009).

79. “Low-energy photoelectron imaging spectroscopy of nitromethane anions: Electron affinity,
vibrational features, anisotropies and the dipole-bound state.” C. L. Adams, H. Schneider, K. M.

80. “The photoelectron spectrum of CCl$_2^-$: The convergence of theory and experiment after a decade of

81. “Pulsed ion extraction diagnostics in a quadrupole ion trap linear time-of-flight mass
10 (2010).
Curriculum Vitae

David M. Leitner
Department of Chemistry and Chemical Physics Program
University of Nevada, Reno/216
Reno, Nevada, 89557

email: dml@unr.edu
phone: (775) 784-1968

Education:
1989  The University of Chicago; Ph.D., Physical Chemistry/Chemical Physics; Research advisor: Professor R. S. Berry
1985  Cornell University; B.S. Chemical Engineering; B.A. Chemistry

Academic Faculty Positions:
2005-  Associate Professor, University of Nevada, Reno
2000-2005  Assistant Professor, University of Nevada, Reno

Research Positions:
1998-2000  Research Faculty, Assistant Project Scientist, University of California, San Diego
1994-1998  Research Associate, University of Illinois at Urbana-Champaign, with Prof. P. G. Wolynes
1991-1994  Research Associate, Universität Heidelberg, with Prof. L. S. Cederbaum
1990  Postdoctoral Research Associate, Brown University, with Prof. J. Doll

Grants, Fellowships and Awards:
12.01.09 – 11.30.11  Volkswagen Foundation, 200,000 Euros (≈ $300,000), “Probing solvation dynamics of antifreeze proteins,” (with M. Havenith, PI; M. Gruebele, co-PI; 59,000 Euros to DML).

09.01.09 – 08.31.11  National Science Foundation CHE-0910669, $267,312, “Energy transport in proteins,”

05.01.05 – 04.30.10  National Science Foundation CHE-0512145, $333,000, “Vibrational dynamics of glasses and large molecules.”

04.15.05 – 03.31.09  National Science Foundation OISE-0437165, $35,000, “Dynamical foundation of protein function.” (NSF-JSPS cooperative grant).

06.01.04 - 03.31.08  Human Frontier Science Program, $1,050,000, “Direct observation and modeling of protein motions important for function and folding.” (co-PI with M. Gruebele and M. Havenith; $300,000 to DML).
Grants, Fellowships and Awards: (continued)

2004
Mousel-Feltner Award for Excellence in Research and Creative Activity, University of Nevada, Reno.

09.15.01 – 08.31.05
National Science Foundation CHE-0112631, $331,830, “Heat transport and chemical reactions in proteins and clusters.”

2001
Research Corporation Research Innovation Award, $35,000.

2000
Camille and Henry Dreyfus New Faculty Award, $40,000.

1999
United Nations International Short Term Advisory Resources Consultant, Department of Physics, Bilkent University, Turkey

Alexander von Humboldt Fellowship

1991-1993
National Science Foundation Postdoctoral Fellowship

Guest Professor

2006 – 2007
Department of Chemistry, Ruhr Universität Bochum, Germany

2006 (Nov., Dec.)
Max Planck Institute for the Physics of Complex Systems, Dresden

Invited Talks:
Physical Chemistry Seminar, Ruhr-Universität Bochum, Germany, July 2010.
Telluride Workshop on Thermal Transport on the Nanoscale, TSRC, June 2010.
Department of Physics Seminar, Universite Libre de Bruxelles, Belgium, June 2010.
Chemistry Department Seminar, Tulane University, January 2010.
Telluride Workshop on Frontiers of Chemical Dynamics, TSRC, January 2010.
Telluride Workshop on Quantum Transport, TSRC, July 2009.
Department of Physics Seminar, Freiburg University, Freiburg, Germany, June 2009.
Biophysics Seminar, University of California, Davis, May 2009.
NSF-JSPS Workshop on Protein Dynamics, Sapporo, Japan, February 2009.
Advances in Chemical Dynamics Workshop, Sante Fe, NM, August 2008.
Department of Physics, Nagoya University, Nagoya, Japan, February 2008.
Workshop on Computational Biophysics, Nagoya University, Nagoya, Japan, Nov. 2007.
Telluride Workshop on Vibrational Dynamics, Telluride Science Research Center, Aug. 07.
Physical Chemistry Institute, Universität Heidelberg, Heidelberg, Germany, May 2007.
Bunsen Discussion Meeting, “Exploring THz Spectroscopy”, Bad Honnef, Germany, Apr. 07.
Department of Chemistry Colloquium, Ruhr-Universität Bochum, Germany, April 2007.
Conference on “Spectroscopy and Dynamics of Molecules and Clusters” (SDMC 07),
Uttarkhand, India, Feb. 2007.
Fritz Haber Institute, Hebrew University, Jerusalem, Israel, Feb. 2007.
Physical Chemistry Institute, Universität Frankfurt, Frankfurt, Germany, Jan. 2007.
Physical Chemistry Institute, Universität Bielefeld, Bielefeld, Germany, Jan. 2007.
Max Planck Inst. for Physics of Complex Systems Colloquium, Dresden, Germany, Dec. 06.
Max Planck Institute for Biochemistry, Göttingen, Germany, Dec. 2006.
Physical Chemistry Institute, Universität Zürich, Zürich, Switzerland, Nov. 2006.
Southwest Regional Meeting of the American Chemical Society, Houston, October 2006.
Gordon Conference on Vibrational Spectroscopy (Discussion Leader), Maine, July 2006.
Department of Chemistry, University of Wisconsin, Madison, January 2006.
Department of Physics, Bilkent University, Ankara, Turkey, June 2005.
Theoretical Biophysics Seminar, University of California, San Diego, June 2005.
Department of Chemistry, University of Colorado, Boulder, January 2005.
Workshop on “Energy Localization: From Small Polyatomics to Large Biomolecules,”
Physical Chemistry Institute, Ruhr Universität Bochum, June 2004.
Department of Chemistry, University of Oregon, May 2004.
Department of Chemistry, The Ohio State University, April 2004.
Department of Chemistry, University of Cincinnati, April 2004.
Department of Chemistry, University of Illinois at Urbana-Champaign, April 2004.
Department of Chemistry, University of California, Irvine, March 2004.
Conference on “Chemical reaction dynamics in complex systems,” Yukawa
Department of Chemistry, University of California, Davis, October 2003.
Conference on “Quantum transport,” Bad Honnef, Germany, March 2003.
Department of Physics, University of Nevada, Reno, February 2002.
Department of Physics, University of Georgia, Athens, GA, February 2002.
Department of Chemistry, University of Maryland, Baltimore Co., December 2001.
Department of Mathematics, University of Nevada, Reno, November 2001.
Department of Chemistry, Bilkent University, Ankara, Turkey, January 2001.
Department of Chemistry, University of Michigan, Ann Arbor, MI, February 2000.
Faculty of Science, Bilkent University, Ankara, Turkey, December 1999.
Physical Chemistry Institute, Universität Heidelberg, Heidelberg, Germany, Nov. 1999.
Department of Physics, University of Athens, Athens, Greece, November 1998.
Condensed Matter Seminar, U. of Illinois at Urbana-Champaign, April 1998.
Department of Chemistry, University of Wisconsin-Madison, April 1996.
Department of Chemistry, University of Cincinnati, October 1995.

Courses Taught:
Chem 121, General Chemistry 1 (Spring 2005, Spring 2010)
Chem 202, Freshman Chemistry for Scientists and Engineers (Spring 2001)
Chem 751, Nonequilibrium Statistical Mechanics (Spring 2009)
Chem 754, Molecular Spectroscopy (Spring 2002, Fall 2005, Fall 2009)
Chem 757, Quantum Chemistry (Fall 2000, 2002, 2008)

Non-Classroom Teaching: Chem 480, Ind. Study; Chem 497, Senior Thesis; Chem 793, Ind. Study; Chem 794C, Chemical Physics Colloquium

Undergraduate and Graduate Advisor and Postgraduate-Scholar Sponsor:
High School Students (1) Mr. Matt Enright. Undergraduates (5) Ms. Reya Kempley, Mr. D. Ponte, Ms. Chantal Reyna, Mr. P. Tomco, Mr. Ben Borgo, Mr. Amber Jain. Graduate Students (6) Mr. J. Agbo, Mr. J. Jensen, Mr. J. Killeen, Ms. K. Kachlishvili, Mr. Marin Djendjinovic, Mr. Yao Xu. Postdoctoral Associates (4) Dr. Xin Yu, Dr. Gia Maisuradze, Dr. J. Park, Dr. Ramachandran Gnanasekaran

Service and Professional Activities:
Chemistry Department
Graduate Recruitment Committee (2000 – 2004)
Chair, Computing and Instrumentation Committee (2004 – 2005); Member (2004 – pres.)
Theory Search Committee (Fall 2003, Spring 2004)
Chair, Publicity and Alumni Relations Committee (2005 - present)
Physical Chemistry Division Liaison (2007 – present)
Director, Chemical Physics Program (2009 – present)

University of Nevada, Reno
Mousel-Feltner Award Committee (2005, 2006, 2008, 2010; Chair, 2006, 2010)

American Chemical Society Sierra Nevada Section
Secretary/Treasurer (2002), Chair-Elect (2003), Chair (2004)

Telluride Science Research Center
Member of the Board (2005-2007)
Organization of Professional Meetings

Workshop on “Vibrational dynamics in condensed and gas phases,” Telluride Science Research Center, Telluride, CO, August 7-13, 2005. (with Prof. Peter Hamm, U. Zürich).


Other Professional Service
Regular reviewer for professional journals and funding agencies: J. Phys. Chem. A, B & C; J. Chem. Phys.; Physical Review Letters, B & E; Proteins; PNAS; JACS; Biopolymers; Theochem.; National Science Foundation; American Chemical Society.


Membership: AAAS, American Chemical Society, American Physical Society
Books edited:


Publications:


ROBERTO C. MANCINI
Department of Physics
University of Nevada, Reno
Reno, NV 89557-0058

Ph.: (775) 784-6595, Fax: (775) 784-1398, E-mail: rcman@unr.edu

EDUCATION

PROFESSIONAL RECORD
6. Appointed to the Graduate Studies Faculty, University of Florida, 1992.
7. Assistant Professor of Physics, University of Nevada, Reno, 1993-1996.
8. Appointed to the Graduate Faculty, University of Nevada, Reno, 1994.
9. Associate Professor of Physics, University of Nevada, Reno, 1996-2003.
10. Vice-Chair, Physics Department, University of Nevada, Reno, 1999-2004.
11. Professor of Physics, University of Nevada, Reno, 2003-present.
14. Chair, Physics Department, University of Nevada, Reno, 2007-2010.


MEMBERSHIP IN PROFESSIONAL SOCIETIES
1. American Physical Society
2. Plasma Physics Division, American Physical Society
SUMMARY

Awards: 4  
Papers in refereed journals: 99  
Papers in conference proceedings and other publications: 40  
Book editor and invited chapters: 2  
Total number of publications: 141  
Invited papers and talks: 24  
Seminars, Lectures and Colloquia: 24  
Students graduated with Ph.D. degree in Physics: 4  
Students graduated with M.S. degree in Physics: 5  
Supervision of Post-Docs: 4  
Supervision of Senior Thesis projects: 5  
Supervision of High-School Students: 2  
Editorial Board  
Referee and reviewer work  
Conference and workshop organization  
Book editor, and invited book chapters  
Total cumulative funding: $4,626,500.

My research program at the University of Nevada, Reno (UNR) is in theory and modeling of atomic and radiation physics with emphasis on spectroscopy of high-energy-density plasmas. I collaborate closely with several experimental groups in National Laboratories and Universities in the U.S., Europe and Japan, including Lawrence Livermore (LLNL), Los Alamos (LANL) and Sandia National Laboratories (SNL), and the University of Rochester; the Ecole Polytechnique, France; the Max-Planck-Institut für Quantenoptik, Germany; and Osaka University, Japan. In addition, I have dedicated shots to perform experiments at the OMEGA laser facility, a National Laser Users’ Facility supported by the U.S. Department of Energy at the University of Rochester’s Laboratory for Laser Energetics, and at the Z facility of Sandia National Laboratories.

Based on my research program at UNR, I have developed a graduate level course in plasma spectroscopy that has been taken by students and researchers from other institutions in the U.S. and in Europe, including Lawrence Livermore National Laboratory; University of California, Davis; Sandia national Laboratories; Los Alamos National Laboratory; Colorado State University; Cornell University; Massachusetts Institute of Technology; University of Rochester; University of Texas, Austin; University of California, San Diego; Trinity College, Ireland; Imperial College, U.K.; Universidad de Las Palmas, Spain; and Ecole Polytechnique, France. This course is broadcasted in real-time via an internet connection to other institutions. It has been offered in the 2005 Fall Semester, and in the 2010 Spring Semester.
AWARDS

1. New Faculty Award from the Division of Sponsored Research of the University of Florida, June 1991.
2. Junior Faculty Research Award from the Office of Sponsored Research of the University of Nevada, Reno, May 1994.
3. H.K. Shin Award for Excellence in Research, College of Science, University of Nevada, Reno, May 2005.

PUBLICATIONS

Papers in refereed journals: 99
Papers in conference proceedings and other publications: 40
Book editor and invited chapters: 2
Total number of publications: 141

Papers in refereed journals (since 1999)


Papers in conference proceedings and other publications (Since 1999)


**INVITED PAPERS AND TALKS (since 1999)**


SEMINARS, LECTURES AND COLLOQUIA (Since 1999)


23. "Spectroscopic analysis of the spatial structure of ICF implosion cores”, Theory Division Seminar, Los Alamos National Laboratory, Los Alamos, New Mexico, April 1, 2005.


SUPERVISION OF HIGH-SCHOOL, UNDERGRADUATE AND GRADUATE STUDENTS, AND POSDOCS


3. E. Emmons, 1995 Fall Semester, McQueen High School Senior, Washoe County School District Gifted and Talented Program.


6. Dr. A.S. Shlyaptseva, PosDoctoral Research Associate 1995-1998. Placement: Research Associate Professor, Department of Physics, University of Nevada, Reno.


13. ”Survey of the energy level structure of Xe and Sn ions in the configuration average approximation” O. Harraf, Senior Thesis Project, May 2004, University of Nevada, Reno.


15. ”Spectroscopic determination of temperature and density spatial profiles and the effect of mix in inertial confinement fusion implosion cores” L.A. Welser, Ph.D. Physics, May 2006, University of Nevada, Reno. Placement: Post-Doctoral Research Associate, X-Division, Los Alamos National Laboratory.


18. Dr. I.M. Hall, PosDoctoral Research Associate, February 2007-present.

19. Dr. R.J. Florido, PostDoctoraal Research Associate, July 2009-present.

EDITORIAL BOARD

1. Member of the Editorial Board of High Energy Density Physics, an international peer-reviewed journal published by Elsevier, 2007-present.

REFEREE AND REVIEWER WORK


CONFERENCE AND WORKSHOP ORGANIZATION

4. 16th International Conference on Spectral Line Shapes, Berkeley, California, June 3-7, 2002. Member of the Organizing Committee.
5. 10th International Workshop on Radiative Properties of Hot Dense Matter, September 16-20, 2002, St. Malo, France. Member of the Organizing Committee.
7. 14th American Physical Society Topical Meeting on Atomic Processes in Plasmas, Santa Fe, New Mexico, April 19-22, 2004. Member of the Program Committee.
8. 11th International Workshop on Radiative Properties of Hot Dense Matter, Santa Barbara, California, November 1-5, 2004. Chair of the Organizing Committee.
11. 2009 American Physical Society Division of Plasma Physics Annual Meeting, November 1-November 6, 2009, Atlanta, Georgia. Member of the Program Committee.
12. 8th International Conference on High Energy Density Laboratory Astrophysics, Pasadena, California, March 15-18, 2010. Member of the Program Committee.

BOOKS


**GRANTS AND CONTRACTS (Since 1999)**

Total cumulative funding: $4,626,500.


16. Subcontract from a DOE-NNSA HEDS Grant, October 1999, $17,000, 1 year. Project Title: “Experimental and Theoretical Study of the High Energy Density Phase of Spherical Implosions”.

17. DOE-NNSA NLUF Program Grant, November 2000, $208,022, 2 years. Project Title: “Determination of Temperature and Density Gradients in Imploded Cores at OMEGA”. This award also includes 20 OMEGA laser shots.

18. Award from the International Activities Committee of the University of Nevada, Reno to help establish a research collaboration with the Max Planck Institute fuer Quantenoptik, Garching, Germany, May 2001, $2,000.00. Project Title: “Dense Plasmas Driven by High-Intensity, Ultra-Short Duration Pulsed Lasers”.


20. Naval Research Laboratory Grant, June 2002, $65,000, 1 year. Project Title: "Atomic Physics Modeling of High Temperature Plasmas".

21. DOE-NNSA NLUF Program Grant, November 2002, $302,581, 2 years. Project Title: "Experimental and Modeling Studies of 2-D Core Gradients in OMEGA Implosions". This award also includes 20 OMEGA laser shots.

22. Sandia National Laboratories Contract, May 2003, $64,015., 1 year. Project Title: "Spectroscopic Determination of Core Conditions in Z-Pinch Dynamic Hohlraum Implosions".

23. Laboratory for Laser Energetics Contract, October 2003, $64,674, 1 year. Project Title: "Modeling and Analysis of Ti K-shell Line Absorption Spectra in High-Energy-Density Plasmas".

24. DOE-NNSA NLUF Program Grant, November 2004, funding: $350,050, two-year project. Project Title: "Three-dimensional study of the spatial structure of direct-drive implosion cores at OMEGA”. This award also includes 20 OMEGA laser shots.

25. Sandia National Laboratories Contract, July 2004, funding: $133,869, 3-year project. Project Title: "LOBF Spectroscopic Analysis of Core Conditions in Z-Pinch Dynamic Hohlraum Implosions".
26. DOE-OFES/SBIR-STTR Program Grant (in collaboration with Prism Computational Sciences Inc.) July 2005, funding: $30,000, phase 1, six months project. Project Title: ”Development of spectral and atomic models for diagnosing energetic particle characteristics in fast ignition experiments”.

27. Laboratory for Laser Energetics Contract, October 2005, $69,474., 1 year. Project Title: ”X-ray absorption spectroscopy calculations for direct-drive shock-heated plastic targets with buried low-Z tracer layers I”.


29. DOE-OFES/SBIR-STTR Program Grant (in collaboration with Prism Computational Sciences Inc.), August 2006, funding: $225,000, phase 2, 2 years. Project Title: ”Development of spectral and atomic models for diagnosing energetic particle characteristics in fast ignition experiments”.

30. TRIDENT Laser Facility, Los Alamos National Laboratory, 2 weeks of laser time, August 1996. Project Title: ”Opacity measurements of dense aluminum plasmas driven by colliding shock waves”.

31. Laboratory for Laser Energetics Contract, October 2007, $221,929., 3 years. Project Title: ”X-ray absorption spectroscopy calculations for direct-drive shock-heated plastic targets with buried low-Z tracer layers II”.

32. DOE-NNSA Science Stewardship Academic Alliances Program Grant, September 2006, funding: $ 773,097, 3 years. Project Title: ”Experimental and Modeling Studies on the Dynamics of Photoionized Plasmas”. This award also includes shots and experimental work at the ZR facility.

33. DOE-NNSA NLUF Program Grant, December 2006, funding: $369,616, 2 years. Project Title: “Multiview Tomographic Study of OMEGA Direct-Drive Implosion Experiments”. This award also includes 30 OMEGA laser shots.

34. DOE-NNSA NLUF Program Grant, December 2008, funding: $346,000, 2 years. Project Title: ”Three-dimensional studies of low-adiabat direct-drive implosions at OMEGA”. This award also includes 30 OMEGA laser shots.

35. Sandia National Laboratories Contract, July 2009, funding: $95,962, 1 year. Project Title: ”X-ray spectroscopy at Z”.

36. DOE-NNSA-OFES Joint Program on High-Energy Density Laboratory Plasmas, August 2009, funding: $690,000, 3 years. Project Title: ”Experiments and modeling of photoionized plasmas at Z”. This award also includes shots at the Z facility.

37. Lawrence Livermore National Laboratory Contract, April 2010, funding: $100,000, 1 year. Project Title: ”Spectral line shape calculations for x-ray spectroscopy of NIF implosion cores”.
KATHERINE R. MCCALL

College of Science/0424, University of Nevada, Reno, NV 89557-0424
Telephone: 775-682-8720; FAX: 775-784-4592; Internet: mccall@unr.edu

EDUCATION:
PhD 1992 Physics University of Massachusetts/Amherst
MS 1987 Physics University of Massachusetts/Amherst
BS 1985 Physics and Mathematics Mount Holyoke College

PROFESSIONAL EXPERIENCE:
2010 – present  Associate Dean, College of Science  University of Nevada/Reno
2009          Assistant Dean, Operations & Student Programs, College of Science, UNR
           July, Aug 2007  Acting Director, Nevada Terawatt Facility, University of Nevada, Reno
2004 – 2007  Chair, Department of Physics  University of Nevada/Reno
2002 – present  Associate Professor of Physics  University of Nevada/Reno
1996 – 2002  Assistant Professor of Physics  University of Nevada/Reno
1995          Research Assistant Professor  University of New Mexico
1994 – 1995  Staff Scientist  Los Alamos National Laboratory
1994          College Assistant Professor  New Mexico State University
1988 – 1991  Graduate Research Assistant  Schlumberger-Doll Research

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS:
American Geophysical Union, 1992 - present
American Physical Society, 1985 – present

AWARDS:
Visiting Scholar, Cavendish Laboratory, Cambridge University, UK, 2009/10
Visiting Fellow, Fitzwilliam College, Cambridge University, UK, 2009/10
Fulbright Scholar, Catholic University of Leuven, Kortrijk, Belgium, 2003
Alan Bible Teaching Excellence Award, runner up, 2002
Mary Lyon Award to outstanding young alumnae, Mount Holyoke College, 1997
Mad Hatter Award “… given to recognize a degree of commitment to our program, and most
importantly our students, which goes well beyond the bounds of sanity,” Graduate Program
of Hydrologic Sciences, 1997/98

RESEARCH INTERESTS:
Elasticity of inhomogeneous, porous, and disordered materials, such as rock and concrete.
Transport of fluids in porous media, including quantum fluids adsorbed on polycarbonate filters,
water in porous glass, and oil and water in rock. Flow of granular material.
PUBLICATIONS:

Resonant ultrasound spectroscopy and homogeneity in polycrystals, G Kaplan, TW Darling and KR McCall, Ultrasonics 49, 139-142 (2009).


RESEARCH SUPPORT:
Neutron scattering studies of fundamental processes in earth materials, US Department of Energy, 9/1/01 -- 8/31/04, $224,239.

Time, temperature, and saturation dependence in elasticity: The search for mechanism, National Science Foundation, 6/1/01 -- 5/31/04, $120,000.

Neutron spectroscopy of earth materials, Institute for Geophysics and Planetary Physics, Los Alamos National Laboratory, 10/1/99 -- 9/30/02, $69,000 (co-PI Juergen Eckert, LANL).
Ultrasonic determination of moduli in earth materials, Institute for Geophysics and Planetary Physics, Los Alamos National Laboratory, 10/1/99 -- 9/30/02, $69,000 (co-PI Paul Johnson, LANL).

Application of resonant ultrasound spectroscopy to inhomogeneous materials, Office of Naval Research, 6/1/99 -- 5/30/00, $50,000.

Resonant mode inversion technique for rock characterization, Junior Faculty Research Award, University of Nevada, Reno, 7/1/98 -- 12/31/99, $10,000

Resonant mode inversion technique for rock characterization, Institute for Geophysics and Planetary Physics, Los Alamos National Laboratory, 10/1/97 -- 9/30/99, $50,000 (co-PI Paul Johnson, LANL).

A computational laboratory for outreach programs, modern physics, and advanced laboratory techniques, Excellence in Teaching Program, University of Nevada, Reno, 1/1/99 -- 5/1/99, $500, (co-PI Roberto Mancini).

Theoretical investigations of nonlinear elastic properties of rock, National Science Foundation, 6/1/95 -- 5/31/98, $88,000.
INVITED TALKS:
Multiple timescales in thermal relaxation processes in Berea sandstone, 9th international workshop on nonlinear elasticity of materials, Karlskrona, Sweden, May 2004.
Cold neutrons: The perfect way to study hot rocks?, Physics Colloquium, San Diego State University, March 2002.
Superfluid avalanches, Physics Colloquium, New Mexico State University, Las Cruces, NM, March 1997.
Hitting rocks with math and physics, Physics and Mathematics Colloquium, Mount Holyoke College, South Hadley, MA, March 1997.
Experimental determination of the linear and nonlinear dynamic moduli of rock from quasistatic measurements, Seminar, Schlumberger-Doll Research, Ridgefield, CT, October 1996.
Nonlinearity, hysteresis, and discrete memory in rock, Geosciences Seminar, University of Nevada, Reno, NV, February 1996.
SELECTED SERVICE ASSIGNMENTS AND APPOINTMENTS:

Department of Physics

Department Chair, 2004 – 2007
Department Program Review Self-Study (Chair), 2007
Acting Director, Nevada Terawatt Facility, 2007
Strategic Planning for Physics (Chair), 2003
Visiting Assistant Professor, 2004; Atmospheric Physicist, 2005; Atomic & Molecular
Experimentalist, 2006; Laboratory Director, 2007; Plasma Theorist, 2007; Nevada
Terawatt Facility Director, 2007
Undergraduate Curriculum Revision Committee (Chair), 2001
Society of Physics Students Faculty Advisor, 1999 – 2002, 2003
High School Exam and Prize Coordinator, 1998 – 2000

University, College

Graduate Council, 1997 – 2000
University Accreditation Self-Study, Standard 8: Physical Resources (Chair), 2006 – 2007
Search Committees: Differential Geometry Mathematician, 1999; Theoretical Physical
Chemist, 2003; College of Science Dean, 2003; Executive Director, Div. of Atmos. Sci.,
Desert Research Inst., 2007
LeMay Award for Excellence in Teaching selection committee, 2004 – 2007
Alan Bible Award for Excellence in Teaching selection committee, 2005
Faculty Contact, Goldwater Scholarship Applicants, 2001 – 2002
Women in Science and Engineering NSF/EPSCoR summer scholars selection (Chair), 1997
Hydrologic Sciences and Chemical Physics Associate Faculty Member, 1996 - present

Professional

American Institute of Physics, Academia-Industrial Outreach Workshop Steering Com., 2000
Society of Physics Students Zone 18 Councilor, 2000 – 2003
American Geophysical Union Fall Meeting Sessions Convener
1. Recent Advances in Nonlinear Geophysics II, Fall 2002
3. Undergraduate Research in the Geosciences, Fall 2003
Colorado School of Mines, Department of Geophysics Strategic Planning Retreat, 2003
Fulbright Study Abroad Application Review (70 applications), 2007, 2008
Reviews for professional journals and granting agencies (3 – 8 per year)
**TEACHING RESPONSIBILITIES:**
Courses (3-6 credit hours per semester)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 180</td>
<td>Physics for Scientists and Engineers (~130 students)</td>
<td>F01, S02, S08</td>
</tr>
<tr>
<td>PHYS 301</td>
<td>Mathematical Methods (~15 students)</td>
<td>F06, F07, F08</td>
</tr>
<tr>
<td>PHYS 351</td>
<td>Classical Mechanics (~15 students)</td>
<td>F03, F04, F05</td>
</tr>
<tr>
<td>PHYS 426/626</td>
<td>Introduction to Solid State Physics (~12 students)</td>
<td>F96, F98, S00</td>
</tr>
<tr>
<td>PHYS 493/693</td>
<td>Special Problems (~1 student)</td>
<td>F98, F99, S02</td>
</tr>
<tr>
<td>PHYS 497</td>
<td>Senior Thesis (~1 student)</td>
<td>F98, S99, S00, S03, S04, S06</td>
</tr>
<tr>
<td>PHYS 701</td>
<td>Mathematical Physics (~10 students)</td>
<td>F97, F99, F00</td>
</tr>
<tr>
<td>PHYS 702</td>
<td>Classical Mechanics (~10 students)</td>
<td>S96, S98</td>
</tr>
<tr>
<td>PHYS 732</td>
<td>Statistical Mechanics (~10 students)</td>
<td>S97, S99</td>
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<tr>
<td>PHYS 790</td>
<td>Seminar (~10 students)</td>
<td>F99, S00</td>
</tr>
<tr>
<td>PHYS 792</td>
<td>Special Problems (~1 student)</td>
<td>F04, S05</td>
</tr>
<tr>
<td>PHYS 795</td>
<td>Comprehensive Exam</td>
<td>S00</td>
</tr>
<tr>
<td>PHYS 797</td>
<td>Thesis (~2 students)</td>
<td>S/F97, S98, S99, S/F00, S/F02, F04, S/F05 – 06</td>
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<tr>
<td>PHYS 799</td>
<td>Dissertation (~2 students)</td>
<td>S97, F98, S99, S/F00 – 05, F06, S/F07</td>
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<tr>
<td>SCI 110</td>
<td>First-Year Exp. I: Science (36 students)</td>
<td>F07, F08, F10</td>
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<tr>
<td>SCI 120</td>
<td>First-Year Exp. II: Science (36 students)</td>
<td>S08, S09</td>
</tr>
</tbody>
</table>

**Student research**

- **2006** Senior Thesis  J Lenz, *Using resonant ultrasound spectroscopy on fine conducting wires*
- **2005** PhD M Boudjema, *Lattice Boltzmann studies of nuclear magnetic resonance in porous materials*
  
  MS J Jenson, *The physical kinetics of water in Yucca Mountain zeolites via quasielastic neutron scattering*
  
  MS G Kaplan, *Effect of the grain size and bismuth (Bi) impurity concentration on the elastic properties of pure polycrystalline copper (Cu)*
- **2004** PhD TJ Ulrich, *Determination of elastic moduli of rock samples using resonant ultrasound spectroscopy*
  
  Senior Thesis K Williamson, *Comparison of the elasticity of quartz in three configurations*
- **2003** Senior Thesis  J Fenn, *The effect of saturation on rock elasticity*
- **2002** MS MP Gomez-Diaz, *Diffusion of water in rock at low saturation*
  
  MS SA Maddox, *A study of water mobility and dynamics in Calico Hills tuff using quasielastic neutron scattering*
- **2001** MS M Herrick, *Hydraulic conductivity, velocity and the order of the fractional dispersion derivative in a highly heterogeneous system*
  
  Senior Thesis IB Santos, *Student term association from first semester physics*
- **2000** MS TJ Ulrich, *Determination of elastic moduli of rock samples using resonant ultrasound spectroscopy*
  
  Senior Thesis SA Maddox, *Diffusion of water in rock at low saturation*
- **1999** Senior Thesis  T Angelini, *Research on a resonance technique for the measurement of bone depth in human soft tissue*
- **1998** MS M Boudjema, *Heat transport in rock from a ring source*
  
  MS MJ Jennings, *Analysis of nonlinear strain-stress in Berea Sandstone*
HANS MOOSMÜLLER
Research Professor
Atmospheric Sciences Division, Desert Research Institute, Nevada System of Higher Education

EDUCATION
Ph.D. Physics 1988 Colorado State University, Fort Collins, CO
DIPLOM (M.S.) Physics 1982 Ludwigs-Maximilians Universität, München

PROFESSIONAL EXPERIENCE
2006 – Present Graduate Faculty
Chemistry Department, University of Nevada, Reno, NV
Chemical Physics Program, University of Nevada, Reno, NV

2000 – Present Research Professor
Desert Research Institute, University of Nevada System, Reno, NV

1995 – Present Graduate Faculty
Physics Department, University of Nevada, Reno, NV
Atmospheric Sciences Program, University of Nevada, Reno, NV

1995 – 2000 Associate Research Professor
Desert Research Institute, University of Nevada System, Reno, NV

1991 – 1995 Assistant Research Professor
Desert Research Institute, University of Nevada System, Reno/Las Vegas, NV

1988 – 1990 Postdoctoral Research Associate
Magnetics Laboratory, Colorado State University, Fort Collins, CO

1982 – 1988 Graduate Research and Teaching Assistant
Geoscience Center, Nonlinear Optics Laboratory, and Physics Department,
Colorado State University, Fort Collins, CO

1980 – 1982 Graduate Research Assistant
Physics Department, Ludwigs-Maximilians Universität, München, Germany and
Max Planck Institute for Quantum Optics, Garching, Germany

Summer 1979 Intern
IBM München, Germany

Summer 1977 Intern
Bayer Dormagen, Germany

PROFESSIONAL ACTIVITIES
Postdoctoral Adviser
2009 – Present Dr. Rajan K. Chakrabarty
2006 – 2007 Dr. Daniel Obrist
currently Associate Research Professor, Desert Research Institute, NSHE

2003 - 2005 Dr. Claudio Mazzoleni
currently Assistant Professor, Physics Dept., Michigan Tech. University

Graduate Student Adviser
2009 – Present Ms. Guadalupe Paredes-Miranda (Atmospheric Sciences)
2007 – Present Mr. Guoxun Tian (Physics)
2004 – 2008  Dr. Rajan K. Chakrabarty (M.S. in Atmospheric Sciences, 2006; Ph.D. in Chemical Physics, 2008)  
 currently Postdoctoral Research Associate, Desert Research Institute, NSHE  

1999 – 2003  Dr. Claudio Mazzoleni (Ph.D. in Atmospheric Sciences, 2003)  
 currently Assistant Professor, Physics Dept., Michigan Tech. University  

1999 – 2003  Dr. Ravi Varma (Ph.D. in Atmospheric Sciences, 2003);  
 currently Assistant Professor, Physics Dept., Nat. Inst. of Tech. Calicut, India  

1994 – 1997  Dr. Joseph D. Vance (M.S. in Atmospheric Sciences, 1997)  
 currently CEO, Citruslaser LLC, Fort Collins, CO  

Conferences (since 2000)  
Chair, Session 4B: Recent Advances in Biomass Burning Emissions – Source Modeling and Measurement/Aerosol Exposure (7 presentations), Annual Meeting of the American Association for Aerosol Research (AAAR), Minneapolis, MN, October 26-30, 2009.  
Chair, Poster Session 3B: Recent Advances in Biomass Burning Emissions – Wildfire Emissions and Impacts (17 presentations), Annual Meeting of the American Association for Aerosol Research (AAAR), Minneapolis, MN, October 26-30, 2009.  
Chair, Session 2B: Recent Advances in Biomass Burning Emissions – Wildfire Emissions and Impacts (6 presentations), Annual Meeting of the American Association for Aerosol Research (AAAR), Minneapolis, MN, October 26-30, 2009.  
Chair, Session 1B: Recent Advances in Biomass Burning Emissions – Aerosol Characterization (7 presentations), Annual Meeting of the American Association for Aerosol Research (AAAR), Minneapolis, MN, October 26-30, 2009.  
Technical Program Committee, Annual Meeting of the American Association for Aerosol Research (AAAR), Minneapolis, MN, October 26-30, 2009.  
Chair, Poster/Oral Session, Aerosol Workshop on Climate Prediction Uncertainties, Second International Conference on Global Warming and the Next Ice Age, Santa Fe, NM, July 17-21, 2006.  
Chair, Aerosols and Climate Session, Second International Conference on Global Warming and the Next Ice Age, Santa Fe, NM, July 17-21, 2006.  
Chair, Atmospheric Science Session, 61st Northwest Regional Meeting of the American Chemical Society, Reno, NV, June 25-28, 2006.  
Chair, Session 2, Optical Monitoring Methods, Regional and Global Perspectives on Haze: Causes, Consequences, and Controversies (Visibility Specialty Conference), Asheville, NC, October 25-29, 2004.  
Awards

Select Committees
Member, External Review Committee, Los Alamos National Laboratory (LANL) Laboratory Directed Research and Development (LDRD), Resolving the Aerosol-Climate-Water Puzzle (2005-2007)
Member, Adjunct Science Team, Department of Energy’s Atmospheric Science Program (2005-present)
Chair, Bylaws Committee, Atmospheric Sciences Program, University of Nevada, Reno (2005-2008)
Chair, Desert Research Institute’s Emeritus Committee (2008-2009)
Member, Desert Research Institute’s Research Affairs Council (2003-2007)
Chair, Desert Research Institute, Division of Atmospheric Sciences’ Promotion Committee (2003-2006)
Member, Desert Research Institute’s Library Committee (2002-2008)
Member, Desert Research Institute’s Senior Research Council (2000-present)
Member, Air & Waste Management Association's Technical Committee AB-2, Chemistry (1993-2002)
Member, Desert Research Institute’s Faculty Senate (1998-2001)
Member, American Meteorological Society's Committee on Laser Atmospheric Studies (1995-1998)

Editor
Special 2010 issue of “Atmospheric Chemistry and Physics” entitled "Measurement and Modeling of Aerosol Emissions from Biomass Burning”

Membership
Air & Waste Management Association
American Association for Aerosol Research
American Geophysical Union
Optical Society of America

RESEARCH GRANTS AND CONTRACTS (TOTAL FUNDING OF $20,049,692)

<table>
<thead>
<tr>
<th>Title</th>
<th>Development of a Photoacoustic Aerosol Light Absorption and Albedo Spectrometer for the Characterization of Aerosol Radiative Transfer in the Solar Spectrum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigators</td>
<td>H. Moosmüller, W. P. Arnott, and C. Mazzoleni</td>
</tr>
<tr>
<td>Status</td>
<td>Selected for funding (3 years)</td>
</tr>
<tr>
<td>Sponsor</td>
<td>National Science Foundation, Division of Atmospheric Sciences</td>
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<tr>
<td>Funding</td>
<td>$ 928,321</td>
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<table>
<thead>
<tr>
<th>Title</th>
<th>Characterization of Wavelength Dependent Mineral Dust and Biomass Burning Aerosol Single Scattering Albedo for GLORY Retrieval of Aerosol Parameters</th>
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<tbody>
<tr>
<td>Status</td>
<td>Selected for funding (3 years)</td>
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<tr>
<td>Sponsor</td>
<td>NASA ROSES: GLORY SCIENCE TEAM</td>
</tr>
<tr>
<td>Funding</td>
<td>$ 482,989</td>
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<table>
<thead>
<tr>
<th>Title</th>
<th>Building Research and Educational Capacity for Satellite Remote Sensing of Aerosols and their Radiative and Climate Change Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigators</td>
<td>H. Moosmüller, K. Ehlers, and W. P. Arnott</td>
</tr>
<tr>
<td>Status</td>
<td>Selected for funding (3 years)</td>
</tr>
<tr>
<td>Sponsor</td>
<td>NASA EPSCoR through Nevada System of Higher Education</td>
</tr>
<tr>
<td>Funding</td>
<td>$ 1,125,000</td>
</tr>
</tbody>
</table>
Title: Infrastructure Building for Research and Education on the Role of Combustion Aerosols in Climate Change
Investigators: H. Moosmüller and R. K. Chakrabarty
Duration: August 1, 2009 – May 15, 2010
Sponsor: NASA EPSCoR through Nevada System of Higher Education
Funding: $ 39,990

Title: Aerosol Characterization Equipment for Climate Change Monitoring Transects
Investigators: H. Moosmüller
Duration: July 1, 2009 – June 30, 2012
Sponsor: National Science Foundation EPSCoR Equipment Grant through Nevada System of Higher Education
Funding: $ 184,000

Title: MRI: Development of a Cavity Ring-Down Sensor for Real-Time Measurement of Atmospheric Mercury Concentrations and Fluxes
Duration: September 1, 2009 – August 31, 2012
Sponsor: National Science Foundation, Division of Atmospheric Sciences Major Research Instrumentation Program
Funding: $ 933,776

Title: Aerosol Modification of Snow Albedo in Southern Nevada and its Influence on Snow Melt and Spring Runoff
Investigators: D. Dubois and H. Moosmüller
Duration: July 1, 2009 – June 30, 2010
Sponsor: National Science Foundation EPSCoR Seed Grant through Nevada System of Higher Education
Funding: $ 47,446

Title: Nevada Infrastructure for Climate Change, Science Education, and Outreach – Graduate Research Fellowship: Mr. G. Tian
Investigators: H. Moosmüller
Duration: September 1, 2009 – August 31, 2010
Sponsor: National Science Foundation EPSCoR through Nevada System of Higher Education
Funding: $ 36,665

Title: Nevada Infrastructure for Climate Change, Science Education, and Outreach – Task 3 (Graduate Research Assistantship: Mr. G. Tian)
Investigators: H. Moosmüller
Duration: January 1, 2009 – August 31, 2009
Sponsor: National Science Foundation EPSCoR through Nevada System of Higher Education
Funding: $ 28,071

Title: Acquisition of Tekran Mercury Speciation Modules for Reactive Gaseous Mercury (Model 1130) and Particulate Mercury (Model 1135)
Investigators: H. Moosmüller and D. Obrist
Duration: February 1, 2008 – July 31, 2008
Sponsor: National Science Foundation EPSCoR through Nevada System of Higher Education
Funding: $ 69,540
Title: Utilization and Testing of Cognitive Information Processing Techniques for the Optimized Real-Time Data Analysis and Instrument Control of a Cavity Ring-down Mercury Sensor (Student Fellowship)

Investigators: G. Tian, H. Moosmüller, and D. Koracin

Duration: August 1, 2007 – July 31, 2008

Sponsor: National Science Foundation EPSCoR through Nevada System of Higher Education

Funding: $42,333

Title: Mexico SEM Analysis

Investigators: H. Moosmüller and W. P. Arnott

Duration: February 20, 2007 – August 31, 2007

Sponsor: Los Alamos National Laboratory – Department of Energy

Funding: $8,000

Title: Development of an Optical Method for Sensing Mercury in Real Time with Below Background Sensitivity: Proof of Concept

Investigators: H. Moosmüller and W. P. Arnott

Duration: September 1, 2006 – November 30, 2008

Sponsor: National Science Foundation EPSCoR through Nevada System of Higher Education

Funding: $74,951

Title: Algorithm Development and Implementation for Nevada EPSCoR Research

Investigators: H. Moosmüller

Duration: November 3, 2006 – May 31, 2007

Sponsor: National Science Foundation EPSCoR through Nevada System of Higher Education

Funding: $7,968

Title: Characterization of Size, Structural and Fractal Properties of Atmospheric Particulate Matter Using Cognitive Information Processing (Student Fellowship)


Duration: July 1, 2006 – June 30, 2008

Sponsor: National Science Foundation EPSCoR through Nevada System of Higher Education

Funding: $84,666

Title: Acquisition of a Tekran 2537A Mercury Vapor Analyzer

Investigators: D. Obrist and H. Moosmüller

Duration: May 1, 2006 – May 31, 2007

Sponsor: Desert Research Institute, Research Enhancement Program

Funding: $35,000

Title: Remote Sensing of PM, CO, HC, and NOx Vehicle Emissions

Investigators: H. Moosmüller and H. D. Kuhns

Duration: May 1, 2006 – April 30, 2007

Sponsor: California Air Resources Board, Research Division

Funding: $69,273

Title: Atmospheric Mercury Emissions and Mercury Contamination due to Modern Gold Mining in Nevada

Investigators: D. Obrist and H. Moosmüller

Duration: April 1, 2006 – March 31, 2007

Sponsor: Desert Research Institute, Institute Project Assignment

Funding: $12,142
<table>
<thead>
<tr>
<th>Title</th>
<th>Investigators</th>
<th>Duration</th>
<th>Sponsor</th>
<th>Funding</th>
</tr>
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<tbody>
<tr>
<td>Saharan Dust Study – Mineralogy and Optical Properties</td>
<td>J. Engelbrecht, H. Moosmüller, and J. A. Gillies</td>
<td>April 1, 2006 – March 31, 2009</td>
<td>Desert Research Institute, Research Enhancement Program</td>
<td>$ 30,000</td>
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<tr>
<td>Measuring the Asymmetry Parameter in Aerosol Scattering</td>
<td>H. Moosmüller</td>
<td>July 1, 2005 – June 30, 2007</td>
<td>Desert Research Institute, Research Enhancement Program</td>
<td>$ 30,000</td>
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<tr>
<td>Acquisition of an X-Ray Diffractometer (EAR-0521619)</td>
<td>J. Engelbrecht, E. V. McDonald, H. Moosmüller, J. A. Gillies, and J. R. McConnell</td>
<td>September 15, 2005 – August 31, 2007</td>
<td>National Science Foundation, Division of Atmospheric Sciences Major Research Instrumentation Program</td>
<td>$ 269,163</td>
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<tr>
<td><strong>Title:</strong></td>
<td>Particulate Matter Emissions Factors for Dust from Unique Military Activities (CP-1399)</td>
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<tr>
<td><strong>Investigators:</strong></td>
<td>J. A. Gillies, H. Moosmüller, V. Etyemezian, H. D. Kuhns, W. P. Arnott, and J. G. Watson</td>
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<td><strong>Duration:</strong></td>
<td>September 1, 2004 – January 31, 2010</td>
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<td><strong>Sponsor:</strong></td>
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<td><strong>Funding:</strong></td>
<td>$ 1,698,400</td>
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<tr>
<th><strong>Title:</strong></th>
<th>Measurement, Modeling and Analysis Methods for Airborne Carbonaceous Fine Particulate Matter (PM$_{2.5}$)</th>
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<tr>
<td><strong>Duration:</strong></td>
<td>October 1, 2003 – September 30, 2008</td>
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<td><strong>Sponsor:</strong></td>
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<td><strong>Funding:</strong></td>
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<th><strong>Title:</strong></th>
<th>Measurements and Modeling of Diesel Exhaust Emissions from Engines Used by the U.S. Military (CP-1336)</th>
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<tr>
<td><strong>Investigators:</strong></td>
<td>J. G. Watson, H. Moosmüller, H. D. Kuhns, and P. W. Barber</td>
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<td><strong>Duration:</strong></td>
<td>April 1, 2003 – August 31, 2007</td>
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<td><strong>Sponsor:</strong></td>
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<th><strong>Title:</strong></th>
<th>Optical Properties of Particulate Matter Emitted by Fires (Pilot Study)</th>
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<tr>
<td><strong>Investigators:</strong></td>
<td>H. Moosmüller and W. P. Arnott</td>
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<td><strong>Duration:</strong></td>
<td>March 31, 2003 – December 31, 2004</td>
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<td><strong>Sponsor:</strong></td>
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<td><strong>Funding:</strong></td>
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<th><strong>Title:</strong></th>
<th>2003 Aerosol IOP at DOE’s ARM Site</th>
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<tr>
<td><strong>Investigators:</strong></td>
<td>W. P. Arnott and H. Moosmüller</td>
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<tr>
<td><strong>Duration:</strong></td>
<td>March 17, 2003 – December 31, 2003</td>
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<td><strong>Sponsor:</strong></td>
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<th><strong>Title:</strong></th>
<th>Development of an Instrument for Multi-Spectral Measurement of Atmospheric Light Absorption (ATM-0340423)</th>
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<tr>
<td><strong>Investigators:</strong></td>
<td>W. P. Arnott and H. Moosmüller</td>
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<tr>
<td><strong>Duration:</strong></td>
<td>August 15, 2002 – August 14, 2007</td>
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<td><strong>Sponsor:</strong></td>
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<tr>
<th><strong>Title:</strong></th>
<th>Use of Novel Infrared Light Emitting Diodes (LEDs) for the Remote Sensing of Automotive Emissions</th>
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<tr>
<td><strong>Investigator:</strong></td>
<td>H. Moosmüller</td>
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<tr>
<td><strong>Duration:</strong></td>
<td>July 1, 2002 - June 30, 2004</td>
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<tr>
<td><strong>Sponsor:</strong></td>
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<tr>
<td><strong>Funding:</strong></td>
<td>$ 11,500</td>
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</table>
Title: In Situ Aerosol Absorption Measurement Characterization Experiment
Investigators: W. P. Arnott and H. Moosmüller
Duration: May 2, 2002 – May 2, 2003
Sponsor: Department of Energy, Pacific Northwest National Laboratory
Funding: $ 67,738

Title: Southern Nevada Air Quality Study: Phase III
Investigators: J. G. Watson, P. W. Barber, and H. Moosmüller
Duration: September 1, 2001 – September 30, 2005
Sponsor: Department of Transportation, Federal Transit Authority
Funding: $ 777,000

Title: Gasoline/Diesel PM Split Study: Chemical Analysis, Ambient Sampling, and Apportionment Phase
Duration: March 15, 2001 – September 30, 2002
Sponsor: Department of Energy, National Renewable Energy Laboratory
Funding: $ 754,299

Title: Characterizing and Quantifying Local and Regional Particulate Matter Emissions from Department of Defense Installations (CP-1191)
Duration: February 1, 2001 – January 31, 2004
Sponsor: Department of Defense, Strategic Environmental Research & Development Program (SERDP)
Funding: $ 938,253

Title: Photoacoustic Instrument
Investigators: W. P. Arnott and H. Moosmüller
Duration: October 16, 2000 – December 31, 2000
Sponsor: Max Planck Institute for Chemistry, Germany
Funding: $ 67,995

Title: CRC Project No. E-56: Instrumentation Field Demonstration
Investigators: R. E. Keislar, H. Moosmüller, and J. G. Watson
Duration: September 1, 2000 - March 31, 2001
Sponsor: Coordinating Research Council
Funding: $ 32,604

Title: BRAVO: Special Aerosol Light Absorption and Extinction Measurements
Investigators: H. Moosmüller and W. P. Arnott
Duration: October 1, 1999 - September 30, 2000
Sponsor: CIASTA, National Park Service
Funding: $ 77,800
Title: Aerosol Light Absorption Measurements  
Investigators: W. P. Arnott and H. Moosmüller  
Duration: July 15, 1999 - July 14, 2000  
Sponsor: Department of Energy, Pacific Northwest National Laboratory  
Funding: $ 23,454

Title: Photoacoustics of Aerosols  
Investigators: W. P. Arnott and H. Moosmüller  
Duration: July 1, 1999 - June 30, 2000  
Sponsor: Office of Naval Research through University of Mississippi, National Center for Physical Acoustics  
Funding: $ 27,343

Title: Southern Nevada Air Quality Study: Phase I  
Investigators: J. G. Watson H. Moosmüller, R. E. Keislar, M. C. Green, and W. R. Stockwell  
Duration: May 14, 1999 - December 31, 2002  
Sponsor: Department of Transportation, Federal Transit Authority  
Funding: $ 999,742

Title: Characterization of Particulate Emissions: Size Fractionation and Chemical Characterization (CP-1106)  
Duration: May 1, 1998 – May 31, 2002  
Sponsor: Department of Defense, Strategic Environmental Research & Development Program (SERDP) through University of Utah  
Funding: $ 565,118

Title: Simple Particulate Emission Measuring System  
Investigators: H. Moosmüller and W. R. Pierson  
Duration: September 30, 1998 - February 29, 2000  
Sponsor: Department of Energy, Office of Transportation Technologies  
Funding: $ 269,002

Title: Development of Instrumentation to Measure Atmospheric Light Extinction and its Scattering and Absorption Components (ATM-9871192)  
Investigators: H. Moosmüller and W. P. Arnott  
Duration: August 28, 1998 - July 31, 2002  
Sponsor: National Science Foundation, Division of Atmospheric Sciences, Major Research Instrumentation Program  
Funding: $ 804,645

Title: Atmospheric Aerosol Correction for Airborne Hyperspectral Measurements  
Investigators: H. Moosmüller, D. Koracin, and M. Wetzel  
Duration: May 26, 1998 - March 31, 2000  
Sponsor: Department of Energy through Bechtel, Center for Excellence in Remote Sensing  
Funding: $ 178,862

Title: SCOS97 Quality Assurance Management  
Investigators: E. Fujita, H. Moosmüller, M. Green, and J. Bowen  
Duration: June 1, 1997 - December 31, 1997  
Sponsor: Ventura County Air Pollution Control District  
Funding: $ 56,132
<table>
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<th>Title</th>
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<tr>
<td>CEDAR: An Operational CW Solid-State Laser System for Temperature and Wind Measurements in the Mesopause</td>
<td>$77,341</td>
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<td>Investigator: H. Moosmüller</td>
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<td>Duration: January 1, 1997 - May 31, 1999</td>
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<tr>
<td>Sponsor: National Science Foundation, Division of Atmospheric Sciences, Upper Atmosphere Research Section</td>
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<tr>
<td>An Interferometric Turbulence Sensor</td>
<td>$11,783</td>
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<tr>
<td>Investigator: H. Moosmüller</td>
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<td>Duration: January 1, 1996 - June 30, 1998</td>
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<td>Sponsor: Desert Research Institute, Institute Project Assignment</td>
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<tr>
<td>CEDAR: Approaching an Ultimate Lidar for Temperature and Wind Measurements in the Mesopause Region</td>
<td>$206,447</td>
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<td>Investigator: H. Moosmüller</td>
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<td>Duration: July 1, 1994 - December 31, 1996</td>
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<tr>
<td>Sponsor: National Science Foundation, Division of Atmospheric Sciences, Upper Atmosphere Research Section</td>
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<tr>
<td>Analysis of UV-DIAL Data Taken During the COAST Study</td>
<td>$85,731</td>
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<tr>
<td>Investigator: H. Moosmüller</td>
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<td>Duration: April 1, 1994 - December 31, 1994</td>
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<tr>
<td>Sponsor: Texas Natural Resource Conservation Commission</td>
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<tr>
<td>A New Lidar Method Utilizing Elastic and Raman Scattering for the Measurement of Backscattering and Extinction Profiles</td>
<td>$9,760</td>
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<td>Investigator: H. Moosmüller</td>
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<tr>
<td>Duration: January 1, 1994 - June 30, 1994</td>
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<td>Sponsor: Desert Research Institute, Institute Project Assignment</td>
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<tr>
<td>Advanced Methods to Measure Light Absorption by Aerosol Particles</td>
<td>$338,978</td>
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<tr>
<td>Investigators: W. P. Arnott, H. Moosmüller, and C. F. Rogers</td>
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<tr>
<td>Duration: November 1, 1993 - October 30, 1997</td>
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<tr>
<td>Sponsor: Environmental Protection Agency, Office of Exploratory Research</td>
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<tr>
<td>Basic Research Cooperative in Remote Sensing (CR-816826)</td>
<td>$1,580,681</td>
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<tr>
<td>Investigators: C. D. Elvidge, H. Moosmüller, and M. C. Green</td>
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<tr>
<td>Duration: August 1, 1990 - December 31, 1993</td>
<td></td>
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<tr>
<td>Sponsor: Environmental Protection Agency, Office of Research and Development</td>
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</table>

**PUBLICATIONS**

**Peer Reviewed Publications (Since 2000)**


Patents

INVITED PRESENTATIONS (250)
CURRICULUM VITAE

Ronald Arthur Phaneuf

WORK ADDRESS:  
Department of Physics /220  
University of Nevada, Reno  
Reno, NV 89557-0058  
TEL: (775)-784-6818  
FAX: (775)-784-1398  
e-mail: phaneuf@physics.unr.edu

HOME ADDRESS:  
3960 Willow Springs Drive  
Reno, NV 89519  
(775)-746-2535

PERSONAL DATA:  
Birth Date: January 26, 1947  
Birth Place: Windsor, Ontario, Canada  

EDUCATION:  
Ph.D. (Atomic Physics), University of Windsor, Canada, 1973  
M.Sc. (Atomic Physics), University of Windsor, Canada, 1970  
B.Sc. (Honours Physics), University of Windsor, Canada, 1969

ACADEMIC AWARDS:  
National Research Council of Canada Postdoctorate Fellowship, 1973-75  
Province of Ontario Graduate Fellowship, 1969-73  
Steel Company of Canada Bursary, 1966-68  
University of Windsor Entrance Scholarship, 1965-66

PROFESSIONAL AWARDS:  
Foundation Professor, University of Nevada, Reno, 2004  
Alexander von Humboldt Research Award, 2003  
David A. Shirley Award for Outstanding Scientific Achievement at the Advanced Light Source, 2002  
Publication Award, Martin Marietta Energy Systems, 1989  
Fellow of the American Physical Society, 1986

PROFESSIONAL EMPLOYMENT HISTORY:  
1992-present:  
Professor of Physics and Chemical Physics  
Department of Physics  
University of Nevada  
Reno, Nevada 89557-0058  
(Department Chair, 1992-2001, Foundation Professor, 2004)

1975-1992:  
Senior Research Staff Member  
Program Manager, Atomic Physics and Diagnostics Development for Fusion  
Director, ORNL Controlled Fusion Atomic Data Center  
Physics Division, Oak Ridge National Laboratory  
Oak Ridge, Tennessee 37831-6372  
(Research Associate, 1975-81; Research Staff Member, 1981-85; Senior Research Staff Member, 1986-1992; Program Manager 1983-92, Data Center Director 1985-92)

1988-1989:  
Visiting Scientist  
JILA  
University of Colorado and National Institute of Standards and Technology  
Boulder, Colorado 80309-0440
1973-1975:
Postdoctoral Research Associate
Joint Institute for Laboratory Astrophysics
University of Colorado and National Bureau of Standards
Boulder, Colorado 80309-0440

OTHER PROFESSIONAL ACTIVITIES AND DISTINCTIONS:

Member of Screening Panel, E. O. Lawrence Award, U.S. Department of Energy (1994).

Member of Committee on Atomic, Molecular and Optical Sciences (CAMOS), National Research Council, 1990-93.

Member of Atomic, Molecular and Optical Sciences Assessment Panel, Commission on Physical Sciences, Mathematics and Applications, National Research Council, 1992-93.

Member of American Association of Physics Teachers, 1995-present.


Member of Program Committee, International Conference on the Physics of Highly Charged Ions (1990, 1992).


Member of Program Advisory Committee, Holifield Heavy Ion Research Facility, Oak Ridge National Laboratory (1987-89).

Member of Atomic and Molecular Data Center Network (1983-92), and Advisory Group on Atomic and Molecular Data for Fusion Plasma Modeling (1983-93), International Atomic Energy Agency.

PROFESSIONAL SPECIALTIES AND EXPERIENCE:

Management of an academic department as chair and professor for nine years (12 academic and 7 research faculty); director and principal investigator of a state-wide federally-funded academic research program (Nevada DOE EPSCoR, $750,000 per year); management of a research and development program in atomic physics and plasma diagnostics at a national laboratory for ten years (12 professionals, annual budget of $1,500,000).

Teaching of eight different lecture courses, including General Physics I, Physics for Scientists and Engineers I & II, Physical Electronics; development of capstone course on Energy and Society and upper-division course on Waves and Oscillations, and Honors University Seminar on Science, Technology and Society; direction of B.S., M.S. and Ph.D. theses and of postdoctoral fellows in research; undergraduate and graduate academic advisement.

Research on interactions of multiply charged ions with electrons, atoms, molecules and photons; electron capture; electron-impact excitation, ionization and dissociation of ions; photoexcitation and photoionization; autoionizing states and resonances; role of many-electron processes in atomic interactions; role of atomic physics in modeling and diagnostics of high-temperature plasmas in fusion energy research and astrophysics; atomic data compilation and database management, critical data analysis. Experimental techniques include: absolute measurements with crossed and merged beams; electron spectroscopy; laser-produced plasmas; laser photodetachment; electron and ion beam production, analysis and detection; design of charged-particle optics and beam transport systems; position-sensitive and coincidence particle detection; time-of-flight analysis; computer data acquisition, analysis and control of experiments; design of ultra-high-vacuum systems.

Service on committees and panels of the National Research Council, Department of Energy, International Atomic Energy Agency and American Physical Society; three-year term as secretary-treasurer of the Division of Atomic, Molecular and Optical Physics of the American Physical Society; Faculty Senate Executive Board, Graduate Council, academic search committees for faculty, dean, DRI division director and classified staff; University Radiation Safety and Diversity Committees; College Personnel Committee; Dean Evaluation Committee; numerous graduate committees; regular reviewer of proposals and journal manuscripts; co-organizer of
conferences and workshops; science education outreach via physics demonstrations to elementary, middle and high-school students; presenter for Science and Technology Day, Engineers Day and Elder College; judge for regional Science Fair.

EXTERNAL RESEARCH GRANTS:

NASA, Jet Propulsion Laboratory, $22,000, September 1998 – August 1999.
Lawrence Livermore National Laboratory, $2,500, April 1996 – April 1997.

CURRENT RESEARCH COLLABORATORS:

Alejandro Aguilar  Lawrence Berkeley National Laboratory
Nora Berrah  Western Michigan University
John Bozek  Stanford Synchrotron Radiation Laboratory
Carmen Cisneros  Universidad Nacional Autónoma de México, Cuernavaca, Mexico
A. L. David Kilcoyne  Lawrence Berkeley National Laboratory
Brendan McLaughlin  Queen’s University, Belfast, U.K.
Alfred Müller  Justus Liebig Universität, Giessen, Germany
Jan-Michael Rost  Max Planck Institute for the Physics of Complex Systems, Dresden, Germany
Stephan Schippers  Justus Liebig Universität, Giessen, Germany
Nicholas Sterling  Michigan State University

GRADUATE THESES AND DISSERTATIONS SUPERVISED AND COMPLETED:

RESEARCH PRESENTATIONS AND PUBLICATIONS:

47 invited presentations at research conferences and symposia.

31 invited seminars and colloquia at universities and research laboratories.

105 refereed journal articles.

13 other significant scientific and technical publications (reports, book chapters, encyclopedia articles).

INVITED PRESENTATIONS AT CONFERENCES AND SYMPOSIA (Since 1999):


“Photoionization of Ions,” 16th International Conference on the Applications of Accelerators in Research and Industry, Denton, TX, November 3, 2000.


SEMINARS AND COLLOQUIA (Since 1999):

“Shedding Light on Atoms in Carbon Cages: an Electron Dance,” Distinguished Faculty Lecture Series, College of Science,
University of Nevada, November 30, 2009.

“Nuclear Energy: Panacea or Pandora’s Box?”, Sustainable Energy Forum, University of Nevada, October 6, 2009.


“From Light Years to Nanometers: Atomic Physics Between the Big Bang and Big Business,” Physics Colloquium, Justus Liebig University, Giessen, Germany, October 27, 2003.


“Probing the Innards of Ions with Synchrotron Radiation,” University of Nevada, Reno, Feb. 8, 2002.


PUBLICATIONS IN REFEREED JOURNALS (Since 1999):


OTHER SIGNIFICANT PUBLICATIONS:


CURRICULUM VITA
RESEARCH PROFESSOR ALLA S. SAFRONOVA
Physics Department, University of Nevada, Reno
Reno, Nevada  89557-0058
Ph: (775) 784-6040  Fax: (775) 784-1398

EDUCATION
Ph.D. in Atomic and Plasma Physics, Institute of General Physics of Russian Academy of Sciences, Moscow, Russia, 1986

ACADEMIC AND PROFESSIONAL EXPERIENCE

2010 - present  Research Professor at Physics Department of University of Nevada, Reno
1998 - 2010  Associate Research Professor at Physics Department of University of Nevada, Reno
1995 - 1998  Postdoctoral Research Associate at Physics Department of University of Nevada, Reno
1994 - 1994  Visiting Scholar, Physics Department of University of Nevada, Reno (May-December)
1993   Guest worker at Nihon University in Japan (December)
1989 - 1994  Senior Scientific Researcher at Institute of Technical Glass, Moscow, Russia; Head of Research Group
1982 - 1989  Junior Scientific Researcher at the Technical Institute “Volna”, Moscow, Russia
1979 - 1982  Graduate student of Physical Lebedev Institute of Russian Academy of Sciences

Expertise
Modeling of x-ray spectra of high-temperature z-pinch, ultrashort-pulse laser, and tokamak plasmas; x-ray and extreme ultraviolet spectroscopy; x-ray line polarization and modeling of polarized spectra produced by different radiation sources; new x-ray diagnostics: plasma polarization spectroscopy and diagnostics of high-energetic electron beams and magnetic fields in plasmas.

SELECTED PUBLICATIONS (out of the total of 162)


Ph. D. Thesis Advisor

S.B. Hansen UNR, Reno, Ph.D. graduate 2003
S. Hamasha UNR, Reno, Ph.D. graduate 2004
M.F. Yilmaz UNR, Reno, Ph.D. graduate 2009
N.D. Ouart, P.G. Wilcox, M.E. Weller currently being advised at the UNR. Reno

Award

Hyung K. Shin Outstanding Research Award, COS, UNR, 2010

Grant Activity (PI: Dr. Alla Safronova):

Grant "Theoretical Study of Radiation from Tungsten Ions for Magnetic Fusion Diagnostics" (DOE/OFES, 2007-2010)


Grant “Modeling of Radiation from Implosions of Copper and Stainless Steel Wire Arrays at the Sandia National Laboratories Z Accelerator”, (Sandia National Laboratories, 2007-2009)

Grant “Theoretical development of L-shell diagnostics of Mo wire array experiments at the Sandia National Laboratories Z accelerator” (Sandia National Laboratories, 2002-2005)

Grant “Theoretical analysis of X-ray M-shell W spectra from the LLNL Electron Beam Ion Trap” (Lawrence Livermore National Laboratory, 2002-2004)

Synergistic activities

Served on Scientific Organizing Committee of 10th International Colloquium on Atomic Spectra and Oscillator Strengths for Astrophysical and Laboratory Plasmas, Berkeley, CA, August 3-7, 2010; on Local Organizing Committee of 16th International Conference on Atomic Processes in Plasmas, Monterey, CA, March 22-26, 2009, on International Organizing Committee of 7th International Conference on Dense Z-pinches, Alexandria, VA, USA, August 17–21, 2008, on DOE Review Panel for Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program, DOE ReNeW workshop panel (Nov. 2009) and DOE Office of Science Graduate Fellowship Onsite Merit Review Panels (March 2010).
Research Professor Alla Safronova

Grant Activity

Principal Investigator of the grant "Theoretical Study of Radiation from Tungsten Ions for Magnetic Fusion Diagnostics" (DOE/OFES, $463,493.0, 2007-2010)

Principal Investigator of the Cooperative Agreement "Theoretical X-ray/ EUV Spectroscopy and Imaging Studies of Wire Array and X-pinich Plasmas" (DOE/NNSA, $1,535,227.0, 2006-2010)

Principal Investigator of the grant “Modeling of Radiation from Implosions of Copper and Stainless Steel Wire Arrays at the Sandia National Laboratories Z Accelerator”, (Sandia National Laboratories, $19,999.0, 2007-2009)

Principal Investigator of the grant “Calculations of dielectronic satellites to Ne-like W“ (DOE/Lawrence Livermore National Laboratory, $12,207.00, 2004)

Principal Investigator of the grant “Theoretical development of L-shell diagnostics of Mo wire array experiments at the Sandia National Laboratories, 2002-2005"

Principal Investigator of the grant “Theoretical analysis of X-ray M-shell W spectra from the LLNL Electron Beam Ion Trap“ (DOE/Lawrence Livermore National Laboratory, $22,285.00, 2002-2004)

Co-Principal Investigator of the grant from Cornell University (DOE Cooperative Agreement, $509,603.00 , 2002-2008)

Principal Investigator of the grant “Theoretical development of M-shell diagnostics at the Sandia National Laboratories Z accelerator “(Sandia National Laboratories, 2001-2002)

Principal Investigator of the International Activity Grant (UNR foundation, Reno, Nevada, 1999-2000)


Principal Investigator of the International SOROS Short-Term Research Grant, 1993.
Publications by A. S. Safronova (Shlyaptseva)


Dynamics and X-Ray Scaling at Multiple-MA Drive Currents for a Compact Multisource Hohlraum Configuration”, Physical Review Letters 104, 125001 (2010)


CURRICULUM VITA

Hyung Kyu Shin

EDUCATION:

B. S., Chemistry (Honors), University of Utah, Salt Lake City, Utah, Mar. 1957 - June 59
Ph.D., Physical Chemistry, University of Utah, Salt Lake City, Utah, July 1959 - June 61

ACADEMIC APPOINTMENTS:

Graduate Teaching and Research Fellow, Department of Chemistry, University of Utah, Salt Lake City, Utah, 1959-61

Postdoctoral Research Fellow,
Department of Chemistry, Cornell University, Ithaca, New York, 1962-63 (under B. Widom), 1963-64 (under P. Debye)

Faculty Appointments, Department of Chemistry, University of Nevada, Reno, Nevada
Assistant Professor, 1965-67
Associate Professor, 1967-70
Professor, 1970-2006
Department Chair, 1976-80 and 1991-95
Professor Emeritus, 2006

AWARDS:

Annual Sigma Xi Research Award, University of Utah, 1961
Outstanding Researcher of the Year Award, University of Nevada, Reno, 1975
Teacher of the Year, Residence Hall Honor Society, University of Nevada, Reno, 1983
University Foundation Professor, University of Nevada, Reno, 1984-87
Alan Bible Excellence in Teaching Award, University of Nevada, Reno, 1986
Alan Bible Excellence in Teaching Award, University of Nevada, Reno, 2000
Distinguished Faculty Award, University of Nevada, Reno, 2003

RESEARCH INTERESTS:

Chemical kinetics and dynamics of combustion and atmospheric reactions
Dynamics of energy flow in anion clusters
Vibrational relaxation at low temperatures
Dynamics of gas-surface reactions
Theory of collision-induced intramolecular energy flow

RESEARCH GRANTS:
Petroleum Research Fund (Type G), American Chemical Society, 1965-67, $4,000
U. S. Air Force Office of Scientific Research, 1967-69, $29,000
U. S. Air Force Office of Scientific Research, 1971-73, $57,000
U. S. Air Force Office of Scientific Research, 1973-75, $31,000
U. S. Air Force Office of Scientific Research, 1975-76, $40,000
U. S. Air Force Office of Scientific Research, 1976-78, $34,000
Petroleum Research Fund (Type AC), American Chemical Society, 1981-84, $30,000
University of Nevada Reno Foundation, 1984-87, $15,000
National Science Foundation Advanced Computing Resources Program at Pittsburgh Supercomputing Center computing time grants:

1988-89, $5,000
1989-90, $20,000
1990-91, $5,000
1991-92, $50,000
1992-93, $50,000
1993-94, $50,000
1994-95, $50,000
1995-96, $50,000
1996-97, $50,000
1997-98, $50,000

Computing time grants, National Partnership for Advanced Computational Infrastructure (NPACI), NSF Program administered by San Diego Supercomputer Center:

1998-99, $50,000
1999-00, $50,000
2000-01, $50,000

RESEARCH PUBLICATIONS (Since 1999):


Jonathan David Weinstein

Physics Department / MS 220
University of Nevada
1664 N Virginia St
Reno, NV 89557-0220
USA

email: weinstein@physics.unr.edu
phone: (775) 784-6821
fax: (775) 784-1398
office: Leifson Physics 211
lab: Leifson Physics S12

Education:

**Ph.D. Harvard University**, Cambridge, MA 2002
Thesis: “Magnetic trapping of atomic chromium and molecular calcium monohydride”

**M.A. Harvard University**, Cambridge, MA 1998

**B.S. California Institute of Technology**, Pasadena, CA 1995
Graduated with Honors in Physics

Experience:

**University of Nevada**, Reno, NV
Assistant Professor 2006–
Adjunct Faculty 2005–2006

**Los Alamos National Laboratory**, Los Alamos, NM
Postdoctoral Fellow 2005–2006

**National Institute of Standards and Technology**, Gaithersburg, MD
Postdoctoral Associate 2002–2005

**Harvard University**, Cambridge, MA
Research Assistant for Professor Doyle 1995–2001
Teaching Assistant for Professor Doyle, “Quantum Mechanics I” 1998

**California Institute of Technology**, Pasadena, CA
Teaching Assistant for Professor Tombrello, “Research Tutorial” 1994–1995
Research Assistant for Professor Libbrecht 1994
Research Assistant for Professor Roukes 1993
Research Assistant for Professor Tombrello 1992

Awards:

University of Nevada Mousel-Feltner Award for Excellence in Research and/or Creative Activity 2010
Los Alamos Director’s Postdoctoral Fellow 2005–2006
National Science Foundation Graduate Fellowship 1995–1998
Caltech Prize Scholarship 1993–1995
Barry M. Goldwater Scholarship 1994–1995
Caltech Haren Lee Fisher Memorial Award in Junior Physics 1994
Caltech Jack E. Froehlich Memorial Award 1994
Refereed Publications:


**Articles:**


**Citation statistics**

June 2010, from ISI Web of Knowledge – Web of Science

h-index: 13

Total times cited: 987

2007 citations: 67

2008 citations: 84

2009 citations: 99
Invited Presentations:

“Cryogenic atoms for quantum information & cold chemistry”, BYU Physics Colloquium, Brigham Young University, February 2010.

“Cryogenically-cooled atoms and molecules for nonlinear optics and cold chemistry”, Oregon Center for Optics seminar, University of Oregon, October 2009.


“Atom-molecule coherence and other ultracold oddities”, Atomic physics seminar, Yale University, October 2006.

“Sodium photoassociation, atom-molecule coherence, and other ultracold oddities” Quantum Optics and AMO Physics Seminar Series, University of Toronto, January 2006.


“Sodium photoassociation & ultracold molecules” Physics department colloquium, University of Nevada, Reno, March 2005.

“Collisional cooling and trapping of atoms and molecules” Special Seminar Series: Hot Topics in Atomic, Molecular and Optical Physics, University of Sussex, UK, November 2004.


“Cooling and trapping of underrepresented atoms and molecules” Physics department colloquium, University of Nevada, Las Vegas, March 2003.


“Magnetic trapping of underrepresented atoms and molecules” National Institute of Science and Technology atomic physics seminar, Gaithersburg, Maryland, December 2000.

“Magnetic trapping of calcium monohydride” Workshop on Prospects of Cold Molecules 2, Graz, Austria, November 2000.

“Buffer-gas cooling and magnetic trapping of atoms and molecules” State University of New York at Stony Brook atomic physics seminar, October 2000.


Contributed Presentations and Posters:


“Slow light in a pure nuclear spin system” Mei-Ju Lu and Jonathan Weinstein DAMOP, Houston TX, May 2010.


Funding:

University of Nevada Reno Junior Faculty Research Grant.
Single-PI grant.

National Science Foundation, Division of Physics, Atomic & Molecular Dynamics Program
Award 0900190: “Cold reactive collisions”
Single-PI grant.
2009–2010: $205,000
2010–2011: $85,000
2011–2012: $85,000

National Science Foundation, Physics at the Information Frontier / Division of Physics
Award 0903847: “Atomic ensemble quantum information with nuclear spin”
Single-PI grant.
2009–2012: $306593

Service:

Physics department colloquium organizer 2006–2009
Physics department personnel committee 2009–

Teaching:

Physics 182, *Physics for Scientists and Engineers III - Optics and Modern Physics*
Spring 2007, Fall 2007, Spring 2008

Physics 421, *Quantum Mechanics*
Spring 2009, Spring 2010

Physics 422, *Applications of Quantum Mechanics*
Fall 2009, Fall 2010

Physics 761, *Atomic and Molecular Physics*
Fall 2006, Fall 2008

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Physics 497, Section 17, Senior Thesis
Fall 2007, Fall 2008, Spring 2010, Fall 2010

Physics 693, Section 17, Special Problems
Summer 2009

Physics 792, Section 17, Special Problems
Fall 2007, Spring 2008, Fall 2008
Student research supervised:

Undergraduate students:
Kyle Hardman, Matt Karam, Muir Morrison, Patrick Jose, Ryan Baker, Aja Ellis, Michael Gallaspy

Graduate students:
Mei-Ju Lu, Carmen Coldea, Vijay Singh, Kyle Hardman, Tian Li

Undergraduate student theses:

Kyle Hardman, Matt Karam, Franklin Jose, Tyler Daykin
Peter Winkler
Department of Physics, University of Nevada, Reno, NV 89557-0058
TEL: (775)-784-4935  FAX: (775)-784-1398
e-mail: winkler@physics.unr.edu

EDUCATION
Dr. rer. nat habil. (Physics) 1977 University of Erlangen-Nürnberg, Germany
Dr. rer. nat. (= Ph.D. in Physics) 1969 University of Erlangen-Nürnberg, Germany
Diplom (= M.Sc. in Physics) 1966 University of Frankfurt am Main, Germany
Vordiplom (= B.Sc. in Physics) 1962 University of Frankfurt am Main, Germany

PROFESSIONAL EXPERIENCE
1985 – present  Professor, Department of Physics, University of Nevada, Reno
1979 – 1985  Associate Professor, Department of Physics, University of Nevada, Reno
1977 – 1979  Senior Research Associate, University of Erlangen-Nürnberg, Germany
2002  Visiting Professor, University of Regensburg, Germany (June)
1995  Visiting Professor, University of Heidelberg, Germany (November-December)
1989  Visiting Professor, Manne-Siegbahn-Institute, Stockholm, Sweden (May-June)
1987  Nordita Professor, AFI, Stockholm, Sweden (November-December)
1986  NATO Collaborator, University of Sheffield, UK (August-October)
1974  Post Doctoral Fellow, SUNY at Stony Brook (Physics)
1972 – 1974  Max Kade Scholarship, SUNY at Stony Brook (Theoretical Chemistry)

PROFESSIONAL AWARDS
Fellow of the American Physical Society, 1999
Max Kade Scholarship, 1972 – 1974, SUNY at Stony Brook

RESEARCH INTERESTS
Many-body-effects in atoms, ions, quantum dots and other nanoscale systems.
Theory of resonance phenomena.
Atoms and ions in screening environments

RECENT RESEARCH COLLABORATORS
Matthias Brack  University of Regensburg, Germany
Lorenz S. Cederbaum  University of Heidelberg, Germany
John C. Morrison  University of Louisville, Ky

DIRECTED RESEARCH
Y. Zhang, “Multi-Channel Coupling Equations of the One-Particle Green Function and the Calculation of the He 1s3s2 Resonance”, M.S. (1996)
K. Lamichhane, S. Das and O. Certik; three doctoral students presently working toward their degrees

REFEREED PUBLICATIONS


"Calculation of Electron Hydrogen Scattering Resonances by the Coordinate Rotation Method", P. Winkler, Z. Physik A 283, 149-160 (1977)


INVITED PRESENTATIONS, SEMINARS AND COLLOQUIA (1999- present).


“Coupling of Surface and Volume Dipole Oscillations in C_{60} Molecules”, M. Brack, P. Winkler and M. V. N. Murthy, Sanibel Symposia 2008.

“Collective Dipole Oscillations in C_{60} Molecules”, M. Brack, P. Winkler and M. V. N. Murthy, APS Meeting, California Section 2007.

“It ain't necessarily HΨ = EΨ”, P. Winkler, Molecular Dynamics Workshop, Santa Fe 2007

“Line-broadening due to Stochastic Fluctuations in Plasmas”, P. Winkler, PIERS 2007, Beijing, China

“The use of virial theorems and sum rules in atomic structure calculations”, P. Winkler, Seminar Shanghai University 2007

