DIVISION OF ATOMIC, MOLECULAR AND OPTICAL PHYSICS NEWSLETTER

A Division of The American Physical Society **November 2004**

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INSIDE...

FROM THE CHAIR

Jim McGuire

It is sensible for us to take a little satisfaction from the fact that DAMOP is now the fastest growing division of APS (excluding a few topical groups, forums, and sections that do not directly represent major fields of physics). This indicates that AMO research is doing well. Many of the best young minds are attracted to what we do. Our work is stimulating growth in other areas of science, in industry and in government facilities. This is indeed good news!

On the other hand our growth cannot be taken for granted. The projections for

funding from federal research are all in decline (except possibly for NASA which includes an expensive Mars explorer whose funding is in doubt). Neither is the hope for new funding from industry encouraging at this time when many industries are cutting research programs. The case for basic physics research and the need to invest in the future of our nation scientifically and technologically has been largely drowned out in the recent national election campaigns. To compound these problems, national security concerns have restricted the flow of scientists to our shores and many students who may come to America for a better education are rethinking their options, especially with the rise of improving universities and research facilities in foreign countries.

In principle antidotes for this threat are obvious. Inject doses of excitement about our work at regular intervals in our newspapers (get to know the science writer for you local newspaper, become active in a little K-12 science outreach, help your local science teachers, ...) and get to know elected officials and policy makers (school board members, city councilors, people making decisions about funding, and staff members of your Congressional delegation). APS can give you a hand with some of this (**www.aps.org**). But the most effective results will depend on the efforts of individuals, who take a few minutes from a busy day to help a favorite project along a bit. The need is clear. The cause is sensible. I hope you'll take a moment to make one small step for science to help protect and grow what is so precious to us.

DAMOP 2005

Tim Gay

The 36th meeting of the Division of Atomic, Molecular and Optical Physics (DAMOP) of the American Physical Society will be held in Lincoln, Nebraska from Tuesday, May 17 to Saturday, May 21, 2005. Registration and a reception, as well as two workshops and various committee meetings will be held on Tuesday, May 17. Scientific sessions will begin at 8:00 a.m. on May 18, and will continue until noon on Saturday, May 21, 2005. All scientific sessions (including poster sessions) and committee meetings will be held in the Burnham Yates Conference center adjacent to the Cornhusker Hotel. Detailed information related to the conference may be found at the web site:**http://damop2005.unl.edu/**

Registration

The Deadline for Pre-Registration is 5:00 P.M. Friday, 1 April 2005. Registration forms are available on the APS Meetings website. The registration fee includes the Conference banquet. Registration and Conference check-in will take place at the Cornhusker Hotel/Yates Conference Center. The registration area will be staffed from 12:00 - 8:30 p.m. on Tuesday, May 17. Thereafter, registration will be available during the day, Wednesday, May 18 – Saturday, May 21.

Tutorial Workshops

The meeting will feature two Workshops to be held on Tuesday, May 17:

Generation and Applications of Ultrafast and Intense Pulses. This workshop for students will consist of two morning tutorial sessions given by experts in the field of ultrafast, high-intensity lasers, and a “hands-on” session in the afternoon.

Teaching Workshop. In an afternoon session, several speakers will talk about new developments in teaching introductory physics and upper-level AMO courses. A

morning session will be for former participants in the New Physics and Astronomy Faculty Workshops sponsored by APS and AAPT last year.

Further details about these sessions are available on the local conference website.

Special Events

Special events include an Einstein Centennial Symposium on Saturday, May 21 featuring experts on the history of Einstein's *Annus Mirabulus*, and a Wednesday evening scientific presentation by two-time Nobel Laureate M. Curie. The Friday evening banquet speaker will be Presidential Science Advisor Dr. Jack Marburger. Details of the various special events are available at the local conference website.

Accommodations

We have reserved a block of rooms at a very favorable rate ($85/night, double or single) at the Cornhusker Hotel. **To receive this rate, reservations must be made by Monday, 2 May 2005.** Convenient accommodations are also available at the Lincoln Holiday Inn Downtown, and the Lincoln Embassy Suites. Make sure to mention DAMOP2005 when making your reservation. BOOK YOUR HOTEL ROOM EARLY! Students have the option of staying in the University's Kaufman Residence Center, a modern, attractive dormitory on the campus of the University of Nebraska, located 5 blocks from the conference site. Cost per student is $33.30/day, which includes three meals and all bed and bath linen. Owing to limited space, dormitory rooms are available only for students. For more details, go to the meeting website.

Accompanying Persons Information

A program of day trips is currently being arranged for accompanying persons. These will include, but not be limited to, a tour of the Joslyn Art Museum in Omaha and the world-renowned Sheldon Art Gallery in Lincoln, and a tour of the architecturally unique Nebraska State Capital Building. If you will be accompanied by someone interested in this program, please so note on the meeting registration form. More details of the accompanying persons program are available on the local meeting website.

Travel to Lincoln

United Airlines is the official airline of the DAMOP 2005 meeting. If you or your travel agent call United's toll-free number (1-800-521-4041) to book your reservations to Lincoln, you will receive a 5% discount off the lowest applicable discount fare, including First Class, or a 10% discount off full fare unrestricted coach fares, purchased 7 days in advance. **An additional 5% discount will apply when tickets are purchased at least 30 days in advance of your travel date.** Discounts also apply on Shuttle by United and United Express. Call United's Specialized Meeting Reservations Center at 1-800-521-4041 to obtain the best fares and schedule information. Make sure you refer to **Meeting ID Number 529CD**. Dedicated reservation agents are on duty 7 days a week from 8:00AM to 10:00PM EST. United offers non-stop flights to Lincoln from its hubs in both Chicago and Denver.

Northwest Airlines also has non-stop flights to Lincoln from its hubs in Detroit and Minneapolis/St.Paul. In addition, numerous airlines fly to the Omaha airport, which

is one hour by car from Lincoln. Scheduled van shuttles to Lincoln from the Omaha Airport are available. See the local meeting website for details.

Student Travel Support

Students may apply for travel support to the meeting in Lincoln. For details of the application process, go to http://www.aps.org/units/damop/student.cfm.

Invitations for Visa Purposes

Attendees who wish to have a letter of invitation for the purpose of applying for a U.S. Visa should contact A.F.Starace (email: astarace1@unl.edu) Please include with your message the following: (1) Your complete name and mailing address; (2) Whether you are giving an invited or contributed presentation; (3) The title(s) of your presentation.

Undergraduate Research Symposium

Undergraduate research mentors who wish to nominate students to give invited presentations in the Undergraduate Research Symposium should send their nomination packets to: Don Griffin, Department of Physics, Rollins College, Winter Park, FL 32789-4499 (griffin@vanadium.rollins.edu) by Thursday, 20 January 2005. **Note that this deadline precedes the normal abstract submission deadline by eight days!** See the announcement by the DAMOP education committee below for further details.

Abstract Submission

Complete **contributed** abstract submission instructions can be found at http://www.aps.org/meet/abstracts. Authors of **invited** papers will receive instructions on abstract submission. The deadline for receipt of contributed and invited abstracts is Friday, January 28, 2005 at 5:00 p.m. EST. Post-deadline papers will be accepted until Friday, April 1, 2005, at 5:00 pm EST. We strongly urge you to proof your abstract before submission. NOTE: We are no longer accepting abstracts via e-mail.

To submit a contributed abstract using the online web submission process, an author needs to know two things:
(1) the number and ordering of authors and collaborators; and
(2) abstract content.
The web page will guide you through the rest. Try a test submission before submitting your abstract. Log onto http://abstracts.aps.org and select the meeting TEST. Follow the directions online to create your own practice abstract. When ready to submit your abstract online, select the meeting DAMOP05 by clicking on the appropriate button. A form will be created for you. Simply input the information. Please note: Invited speakers should refer to their letters of invitation for instructions on locating the invited abstract template.

If you have questions regarding abstract submission, please send them to abs-help@aps.org. Please use the sorting categories below when submitting contributed papers. If you do not find the exact category that is appropriate for your abstract, use one that best describes your work. Note that theoretical and experimental work are not distinguished by these categories.

Sorting Categories

1. Atomic and Molecular Structure and Properties
1.1 Spectroscopy, lifetimes, oscillator strengths
1.2 Atomic and molecular structure, including in static fields
1.3 Fundamental symmetries and precision measurements

2. Photon Interactions with Atoms, Ions, and Molecules
2.1 Atomic photoionization and photodetachment processes
2.2 Molecular photoionization, photodetachment, and photodissociation processes
2.3 Strong field (intense laser) processes
2.4 Short pulse (e.g., attosecond, femtosecond) processes

3. Atomic, Molecular, and Charged Particle Collisions
3.1 Atom-atom and atom-molecule collisions
3.2 Reactive scattering and recombination processes
3.3 Electron and positron scattering
3.4 Ion-atom and ion-ion scattering
3.5 Collisions involving clusters
3.6 Collisions involving surfaces

4. Quantum Optics, Matter Optics, and Coherent Control
4.1 Wavepacket dynamics and coherent control
4.2 Atom optics and atom interferometry
4.3 Quantum and/or nonlinear optics
4.4 Cavity QED

5 . Quantum Information
5.1 Entanglement, decoherence, and error correction
5.2 Quantum teleportation and/or quantum cryptography
5.3 Quantum computation

6. Cold Atoms, Molecules, and Plasmas
6.1 Bose-Einstein condensates
6.2 Degenerate Fermi gases
6.3 Atoms in optical lattices
6.5 Ultracold collisions and photoassociation processes
6.6 Laser cooling and trapping
6.7 Low temperature plasmas

7. Special Topics
7.1 Rydberg atoms and molecules
7.2 Exotic atoms and molecules
7.3 Nonlinear dynamics
7.4 New experimental techniques
7.5 New theoretical methods
7.6 Applications of AMO science

MARCH MEETING 2005

Allan Griffin

The March APS meetings are the largest annual physics meetings in the world and DAMOP is playing an increasing role. Following the success of the March Meeting in Montreal (6035 registrants!), 2004 DAMOP will have a strong presence at the March Meeting in Los Angeles, March 21-25, 2005 ; see

http://www.aps.org/meet/MAR05/. We have organized three Invited Sessions as well as four Focus Sessions in LA. DAMOP is also co-sponsoring a few more sessions, with DCMP, DCOMP and DMP as the lead Divisions. The number of DAMOP members attending the March Meeting has continued to increase. In the 2004 Montreal meeting, there were 208 DAMOP members in attendance.

The invited sessions for the March Meeting in 2005 were chosen from nominations made by the DAMOP membership. DAMOP used the DCMP web-based system for nomination of invited speakers, with a deadline for nominations by September 10, 2004. We had a reasonable response, taking into account this was a new procedure for DAMOP members and also the software was being used for the first time.

The DAMOP Invited Sessions in LA are as follows:

1. Recent work on strongly -coupled trapped superfluid Fermi gases (Speakers: Bulgac, Giorgini, Grimm, Petrov, Torma).
2. Randomness and chaos in quantum information processing (Speakers: Emerson, Hayden, Henry, Montangero and Weinstein).
3. Solid state qubits, resonators and quantum optics (Speakers: Blais , Childress, Geller , Gibbs, and Vion).

The DAMOP Program Committee again extends its appreciation and thanks to the Division of Condensed Matter Physics (DCMP) for its very cooperative attitude and helpful assistance.

Note on CONTRIBUTED PAPERS for the 2005 March Meeting:

Abstracts of contributed papers for the 2005 March Meeting in LA are due on **DECEMBER 1, 2004**, by 5pm Eastern Time. More details will be found at http://www.aps.org/meet/MAR05/abs.cfm All papers contributed to one of the topic numbers in Category 21(see below) come to the DAMOP Program Committee for sorting into sessions. We also choose and assign the chairs of these sessions.

We call your attention to the four Special Focus sessions which DAMOP is sponsoring in LA. One invited speaker is embedded in each Focus Session(In a given topic ,there may be several sessions). These Focus sessions give your contributed paper more impact. For more details,
http://www.aps.org/meet/MAR05/focus.cfm#21.15.1

The invited speakers in our four special focus sessions are as follows: 21.15.1 BCS-BEC crossover in Ferm in gases (Ohashi) 21.15.2 Exotic phase transitions in quantum gases(Liu) 21.15.3 Pathways to practical quantum computing (Chang, Deutsch, and Mabuchi) 21.21.4 Computational nanoscience (Delerue, Ferrando, and Stoneham)

Topics in Category 21(DAMOP):

21 Atomic, Molecular and Optical(AMO) Physics
21.1 BEC in Trapped Atomic Gases
21.2 Optical Lattices
21.3 Degenerate Trapped Fermi Gases
21.4 Quasi-One Dimensional Bose Gases
21.5 Novel Phases in Quantum Gases
21.6 Quantum Computing

21.7 Quantum Cryptography
21.8 AMO Processes on Surfaces & in Condensed Matter
21.9 Strong-Field Physics
21.10 Atomic/Molecular Structure & Properties
21.11 Photon Interactions and Atoms & Molecules
21.12 Atomic/Molecular Collisions & Interactions
21.13 Charged Particle Collisions
21.14 Quantum Optics /Ultrafast Phenomena

Special Focus Topics

21.15.1 BCS-BEC Crossover in Fermi gases(DAMOP)
21.15.2 Exotic Phase Transitions in Quantum Gases(DAMOP/DCMP)
21.15.3 Pathways to Practical Quantum Computing(DAMOP/DCOMP)
21.15.4 Computational Nanoscience (DAMOP/DCOMP/DMP)

PRIZES AND AWARDS

Many DAMOP members have received numerous prizes and awards lately. We heartily congratulate them on their accomplishments. Some of these are:

The I.I.Rabi Prize has been awarded to Deborah Jin , *University of Colorado and JILA*. The citation reads:

For her pioneering work in the production of degenerate Fermi gases and exploitation of their novel physical properties.

The Herbert P. Broida Prize has been awarded to **Hanna Reisler,** *University of Southern California*. The citation reads :

For theoretical insights and carefully executed experiments on the detailed dynamics of small molecules.

The Francis Pikpin Award has been awarded to Ronald Walsworth , Harvard-Smithsonian Center for Astrophysics . The citation reads:

For broad investigation in precision measurements involving masers; in particular, for using hydrogen and noble-gas masers in achieving record sensitivities to violations of Lorentz and CPT symmetry in neutrons and protons, and for innovative applications of masers to imaging.

The Prize for Research in an Undergraduate Institute has been awarded to **Murtadha A. Khakoo**, *California State University , Fullerton*. The citation reads:

For his challenging and sophisticated experiments in electron-atom collisions that have provided significant tests of atomic theory and for his energetic, sustained mentoring of students in his research.

The Frederic Ives Medal has been awarded to **Dave Wineland**, *NIST Boulder*. The citation reads:

For the development of laser-manipulated quantum engineering at the single-atom level and application of these methods to quantum logic systems, atomic frequency standards and fundamental tests of quantum mechanics.

The Julius Edgar Lilienfeld Prize was awarded to **H.Jeff Kimble**, *California Institute of Technology*. The citation reads:

For his pioneering work in quantum optics, for his innovative experiments in single-atom optical experiments, and for his skill in communicating the scientific excitement of his research to a broad range of audiences.

PUBLICATIONS ISSUE: OPEN ACCESS

Martin Blume, APS Editor-in-Chief
Thomas McIlrath, APS Treasurer/Publisher

There has been considerable discussion in recent months about what is termed, “Open Access”. The term itself is ill-defined and there has been much passion and posturing in the discussions. The discussions have taken on new significance with a House of Representatives resolution regarding National Institute s of Health (NIH) funded research, a position statement by NIH, and a subsequent statement by the National Academy. There is justified concern amongst our members about the implications of the Open Access movement for the APS. Both the Editor-in-Chief and the Publisher are watching the situation carefully and, when appropriate, participating in the discussion. It is important to note that the communities involved in publishing research are very diverse. The primary focus of the Open Access movement has been the Medical-Health research community. The general public, understandably, has much stronger feelings about access to this information than to physics information. Within the Medical-Health field, the strong interest by practicing physicians and by patients means that a much wider group of interested parties do not have easy, low-cost access to the literature. The journals in this field, as well as the funding mechanisms, have many qualitative differences from those in physics.

There are two separate but related movements, each of which is a form of open access. The first is the NIH effort mentioned above, where the NIH requests that a copy of all articles based on research funded by the NIH be deposited in PubMedCentral (an NIH managed archive) after peer review and publication. These articles will be held for six months and then made available to the public. This form of open access should be familiar to all physicists, since Paul Ginsparg ’s “arXiv” was the model for PubMedCentral. The APS, which takes copyright for arti c les published in its journals, allows authors to post preprints on the arXiv, and then to update them to the final published form. The articles are then available immediately after publication, at the discretion of the author. Hence the NIH proposal is not one that would raise objections from us. A concern is, however, that the government should not be involved in the publishing business nor should it be determining economic models for publication.

The second movement is one in which disparate groups are proposing a different economic model from the subscription “reader pays” model currently in widespread use by many publishers, including the APS. They would substitute an “author pays” model, which would remove access barriers to all publications as far as readers are concerned. Having all publications available without barriers is a very desirable end result, but there are many pitfalls o n the road to this end. Having authors (or their institutions) pay for publication has a checkered history in the physical sciences, and it is not clear that “author pays” is sustainable in the long term. (An example: physicists with small grants have a choice of paying to publish in an “a uthor pays”

open access journal, or sending a graduate student to a meeting. If there is an alternate choice of journal with subscription “reader pays” fees then the choice is simple: send the graduate student. Only when all journals go to the “ author pays” model does this problem go away.) Our approach is to wait and see, while trying out our own smaller open access journals to test the sustainability of this approach. Meanwhile we will certainly oppose attempts by “author pays” enthusiasts to get a government mandate for this approach.

The APS has one fully open access journal: Physical “Review Special Topics – Accelerators and Beams, which is without barriers to authors or to readers. It is supported by the sponsorship of large accelerator laboratories. A second special topics journal, to be funded by author fees, is under development.

If peer review, common formatting, archiving and other features of modern journals are to be carried out, then the cost of these features must be covered. For small journals the costs can sometimes be hidden in an effective subsidy by basing the journal at a University and using their infra-structure and staff. Most physics journals are too large for their costs to be hidden in supporting organizations. The risk in the current climate is that an unreasoned stampede to a particular Open Access model could sweep away unintended targets. This is particularly true if a solution is imposed from a central source. What the Operating Officers are focusing on is to lower the volume of the discussion and to introduce nuances to table. There are some interesting ideas being circulated as a result of the Open Access debate and they should not be dismissed out-of-hand. The research community should continue to be involved and to seek out constructive paths going forward.

ANNOUNCEMENTS FROM COMMITTEES

NOMINATING COMMITTEE

The DAMOP Nominating Committee welcomes suggestions for Vice-Chair, Secretary-Treasurer and Executive Committee candidates. Please forward the names of candidates who are willing to serve, along with a brief supporting statement, to the Chair (Randy Hulet , **randy@atomcool.rice.edu**) or other members of the committee (Tom Rescigno, Linda Young, Ron Walsworth and Chris Monroe).

THESIS PRIZE COMMITTEE

Nominations are solicited for the DAMOP Thesis Prize. Nominations must be received by the Chair (Brett Esry, **esry@phys.ksu.edu**) prior to the deadline for nominations: December 15, 2004. Nominations must be submitted as a whole, EITHER as a single mailing of hard copies of all documents, OR an email attachment consisting of a single file in .PDF format. Further information can be found at **http://www.aps.org/praw/dissdamo/index.cfm**.

THE FELLOWSHIP COMMITTEE NEEDS YOUR INPUT

If you know of any DAMOP member who richly deserves to be a Fellow of the APS but isn’t, please nominate her or him. While it may appear trivially obvious to you that this person deserves to be a Fellow, it is crucial that the case be made effectively in the nomination document. Instructions for nomination can be found at the APS webpage **http://www.aps.org/fellowship/fellinfo.cfm**. For information regarding the nomination of non-DAMOP members (or even non-APS members), contact Tim Gay (**tgay1@unl.edu** .

EDUCATION COMMITTEE: SPECIAL SESSION ON UNDERGRADUATE RESEARCH AT DAMOP 2005

At the DAMOP meeting (May 17 – 21, 2005) in Lincoln Nebraska, there will be a special session featuring research performed by undergraduate students. The Education Committee of DAMOP would like to encourage undergraduate students working in your research programs to apply for participation in this special session. From the applications received, the Committee will select five students to present the results of their work. Travel assistance will be available to those students selected. We welcome submissions in a wide range of topics, including AMO physics and the related areas of other fields such as chemical, plasma, condensed-matter, computational, biological, and nuclear physics. Participation is limited to currently enrolled undergraduate students, and applications from women and minority undergraduate students is strongly encouraged.

The papers will be 20 minutes long, including time for discussion. Students who wish to apply should send an email to Donald C. Griffin (griffin@vanadium.rollins.edu). The body of that email should include the following: (1) title, (2) authors and affiliations, and (3) a one-page summary written by the student describing the project and his/her contribution to it. In addition, as described in the next paragraph, the student should attach to this email the abstract for the paper in APS format. Finally, the student's sponsor (mentor) should submit a separate letter of recommendation to the email address shown above. **All application materials must be received no later than Thursday, January 20, 2005.** This is eight days earlier than the normal abstract submission date.

For those students selected to participate in this special session, the Committee will submit the abstracts directly to DAMOP. Thus the abstracts must conform to APS style and length formats for a contributed paper. Compliance to this format can be checked by going to http://abstracts.aps.org, selecting "Prepare an Abstract," designating "Test Web Abstract," and then choosing "Create an abstract form for me." Next provide the information requested and cut-and-paste the text of the abstract into the indicated box. This will display the abstract as it will appear in the program and will also show any formatting problems. Please DO NOT submit the abstract directly to DAMOP.

Any questions regarding applications to the DAMOP special undergraduate session should be addressed to Donald C. Griffin, chair DAMOP Education Committee, at the email given above.