

# DIVISION OF ATOMIC, MOLECULAR AND OPTICAL PHYSICS NEWSLETTER

A Division of The American Physical Society

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## FROM THE CHAIR

## **Jim McGuire**

Science, through the support it provides us all, offers hope in an uncertain world. Uncertainty in the significance of our deepest thoughts, uncertainty in the relevance of our lives, uncertainty in our day to day existence can be addressed by science, which provides a way to test the effectiveness of our ideas and the usefulness of what we produce, in addition to a means for improving our day to day existence. In many ways atomic, molecular and optical physics has demonstrated repeatedly, in extraordinary ways how powerfully science can touch our lives in a synergy between profound new ideas and applications that change the economies of nations. While we are relatively few in number (for example, the membership of about 43,000 for the American Physical Society is about 1% that of the National Rifle Association), our work has a visible impact in our daily lives, and offers even more promise for the future.

In the ebb and flow of science itself, AMO physics is, on the whole, thriving. In many areas recognition of our work is growing, other communities are finding new uses for the products of our ideas, and our young people are finding excellent career opportunities. More of our papers are being accepted in Nature and Science. Publication in Physical Review A and Physical Review Letters continues to rise so fast that it is a challenge for our journals to handle the overwhelming load. Intelligent people from other countries are eager to come to the US to learn about what we do. And in the long run many of these talented people stay to contribute to science and technology here in the United States.

However, we are also facing formidable challenges and frightening prospects. Science budgets have been flat, and are forecasted to fall. Foreign scientists with useful information are being turned away at our borders. Careers in industry have diminished. The state of science in this country is not visible in the 2004 Presidential campaign.

In my view even AMO science is at risk. Extraordinary opportunities exist to call to attention of our national leaders the importance of science in general and AMO physics in particular, and its impact on the economic, military and social future of this country. Extraordinary opportunities exist to improve science education at every level, including the K-12 level where our nation is seriously lagging almost all the other industrialized countries of the world. Extraordinary opportunities exist for outreach in our communities to show our neighbors how much fun science can be and how accessible it is for everyone. I commend those of you who have actively participated in these efforts, including many of our busiest and most highly recognized AMO colleagues. And I encourage those of you who have not by pointing out the satisfaction of doing something that is both new and needed.

Finally I wish to report briefly on a few specific items. At the top of this list is recognition of the effective leadership that Barry Dunning, with the valuable support of Lew Cocke, has provided this past year. Thanks, guys. And our thanks as well to Pierre Meystre and Regina Heitzer-Momaday, who together did a wonderful job of organizing our annual meeting in Tucson, which attracted over 800 participants. At that meeting over 1,000 letters were sent to multiple members of Congress asking for their support for physics. My thanks to those of you who wrote. Issues facing us this year include DAMOP program reorganization, under the leadership of Charles Clark and Allan Griffin, to meet

the demands of both the regular DAMOP meeting and the March meeting of APS, where DAMOP participation is growing rapidly. We are also considering how to enhance our communication with AMO physicists who live and work in foreign countries where AMO science is also thriving. Sadly our longstanding and prestigious Davison-Germer Prize is no longer being funded by Lucent, so we are exploring ways to respond to this challenge, including the possibility of a change of name and the challenge of raising money to support such a prize. Dan Larson has agreed to head a committee to report next spring some possibilities for us to consider. You are encouraged to contact Dan with your ideas. The regular DAMOP meeting next year will be in Lincoln, Nebraska under the leadership of Tim Gay and Tony Starace. I invite you to inundate these friends of ours with your suggestions, including those for public speakers, outreach and education, together with your favorite recipes for the banquet feast.

## **DAMOP/DAMP 2004**

**Pierre Meystre**

**Local Chair**

The 35th annual meeting of DAMOP was held in Tucson May 25-29, 2004, jointly with the annual meeting of DAMP, its Canadian sister division. The conference was attended by about 730 participants who enjoyed nearly 700 oral and poster presentations, including plenary talks by Bill McConkey, recipient of this year's Allis Prize, and by Paul Julienne, recipient of this year's Davison-Germer Prize. Seventeen invited sessions, 21 contributed oral sessions, and 3 poster sessions with a total of about 370 posters gave the participants plenty of intellectual fodder and enjoyment.

AMO science is going through extraordinarily exciting times, as was amply demonstrated by the "standing-room only" attendance at many of the sessions, and also by passionate discussions during the poster sessions or while walking around the beautiful University of Arizona campus. Amongst the numerous conference highlights, some developments worth mentioning include the study of the BEC-BCS cross-over in quantum degenerate gases and the extension of quantum-degenerate systems to molecules, the emerging field of attoscience, and quantum information science. These and other emerging new directions are infusing our field with renewed vitality, and are attracting some of the best and brightest students to AMO science.

As a testimony to this fact, the Thesis Prize session lived up to its reputation as one of the main attractions of the meeting. As always, one was hard-pressed to single out a winner amongst these extraordinary talented young colleagues. In the end, this year's prize was awarded jointly to Markus Greiner and to James K. Thompson for work done while they were at the Max-Planck Institute for Quantum Optics and at MIT, respectively.

An additional event worth mentioning was the invited session on "Grand Challenges in AMO Science." Despite being scheduled on the Saturday morning at 10:30, at the end of a long and busy week, and despite the numerous tourist attractions in the Tucson area, this session was attended by somewhere between 400 and 500 people eager for a glimpse of things to come in our field.

Special events included a welcoming reception with margarita, mariachis, and South-of-the-Border specialties at the Tucson Historical Society, a wonderful

evening public lecture on “Stone Cold Science” by Eric Cornell, who fascinated an audience of nearly 1000 mostly non-physicists with his flair, passion, and personal charm, as well as an inspiring and highly entertaining after-dinner speech by Neal Lane. Also, following a DAMOP tradition, a series of tutorial lectures was held on the University of Arizona Campus the day preceding the conference (see article by Poul Jessen.)

Special thanks are due to Regina Heitzer-Momaday, who not only took perfect care of all local arrangements with grace and remarkable efficiency, but also used her seemingly unlimited power to arrange for perfect chamber-of-commerce weather. All in all, and in the rather biased opinion of the local committee, the meeting was a wonderful success. It has been a pleasure and a privilege to welcome the AMO community to Tucson, and all that is left for us to do is to invite you to meet again next year in Lincoln for more AMO excitement!

## **DAMOP/DAMP 2004 STUDENT TUTORIALS**

Poul Jessen

For the third time running a series of tutorial lectures was held in conjunction with the DAMOP/DAMP annual meeting. As always, the 1-1/2 hour lectures were aimed at beginning graduate students, but open to anyone wishing to attend. This year, Prof. Carl M. Caves from the University of New Mexico lectured on “Quantum Information: Why, What and How”, Prof. Paul B. Corkum from the National Research Council lectured on “Attosecond Science and Technology”, and Prof. Randy Hulet from Rice University lectured on “Bose-Einstein Condensation and Fermi Degenerate Gases”. The excellent presentations were enjoyed by 55 participants, consisting mainly of graduate students, but also undergraduates, postdocs, people from industry, and a Nobel laureate. Judging by the enthusiastic response from lecturers and audience alike, the tutorials were once again a great success. Student travel was sponsored by the National Science Foundation, and facilities and refreshments provided by the Optical Sciences Center/University of Arizona.

## **DAMOP 2005 : SAVE THE DATES**

The next annual DAMOP meeting will be held 17-21 May 2005 in Lincoln, Nebraska. The conference website (<http://damop2005.unl.edu>) currently has information about housing, travel, social events, etc. Confirmed events include a dramatic presentation of “Marie Curie: A Living History” by Susan Marie Frontczak and a post banquet speech by John H. Marburger III, the current Presidential Science Advisor and Director of the Office of Science and Technology Policy. Currently in the planning stage are a workshop on physics education issues for AMO science, a tutorial session on a forefront area of AMO physics for graduate students and postdocs, and a social program for accompanying persons.

## **MARCH MEETING 2005**

**Information about the March APS Meeting in Los Angeles, March 21-25, 2005**

The March APS meetings are the largest annual physics meetings in the world and DAMOP is playing an increasing role in these meetings. At the 2004 March

Meeting held in Montreal, DAMOP organized two invited sessions, co-sponsored several more with other APS Divisions, including Focus Sessions. In addition, there were many DAMOP sessions of contributed papers. All of our sessions in Montreal were packed, with many attendees from the Division of Condensed Matter Physics (DCMP).

DAMOP is planning on making a strong presence at the March Meeting in Los Angeles, March 21-25, 2005. We will be organizing three Invited Sessions as well as several Focus Sessions in LA. The invited sessions for the March Meeting will be chosen solely from nominations made by the DAMOP membership. We strongly encourage all members to consider submitting a nomination. The deadline for invited session nominations is SEPTEMBER 10, 2004.

For this meeting, DAMOP is adopting the DCMP web-based system for nomination of symposia and invited speakers. Courtesy of DCMP, DAMOP will be able to accept nominations using the standard DCMP interface. DCMP has been using a system of this type for many years, and last year it processed some 800 invited speaker nominations! It is broadly familiar to many members of APS, and though we are only using it on a trial basis this year, we expect that it will be popular with the DAMOP membership. Simple instructions on the use of this system are given below. All nominations submitted will be considered for inclusion in the March Meeting program by the DAMOP program committee, and for inclusion in the 2005 DAMOP Annual Meeting. After August 2, 2004 you may access the submission website

<http://files.abstractsonline.com/SUPT/136/1416/dcmpsubmission.html>. A link to this website will also be found on the DAMOP and DCMP home pages.

Here are some suggestions for a successful nomination of speakers using the DCMP web interface:

1. Each invited session may have up to 5 invited speakers. Ideally, your nomination will suggest a theme title for an invited session, with 5 suggested speakers and provisional titles of their talks (invited speakers can change it later). You should also nominate a Session Chair (it can be you!).
2. You will be required to select a Sorting Category number for your nomination. Choose category 21: Atomic, Molecular, and Optical Physics. This will ensure that your nominations are forwarded to the DAMOP program committee. If you wish your nomination to also be considered by the DCMP program committee for inclusion in their invited sessions, just enter a note in the comments field of the nomination form.
3. A rule of the March APS meeting is that no one may give invited talks in two successive years unless specifically invited by the APS (e.g. if they win an APS prize, or for other broad purposes). Thus, invited speakers at the 2004 March meeting are ineligible for nominations in 2005. For speakers at the 2004 March meeting, see <http://www.aps.org/meet/MAR04/baps/>.
4. Of course, you can also suggest a single invited speaker or just a few. The Focus Sessions have one invited speaker in the middle of the session.
5. You will be asked to briefly justify your suggestions for a topic and speakers. This could include a brief description of each talk, as well as reference to a recent published paper (PRL, Nature, Science, etc) on the suggested topic.
6. After you have entered all the information onto the Web form, review it

carefully before submission. However, you will be also able to edit/ alter your nomination within the system, at any time before the submission deadline of Sept 10.

While the selection of invited speakers for the DAMOP meeting in Lincoln, NB in 2005 is a separate process, nominations for the March Meeting will be considered by the DAMOP Program Committee for possible inclusion in the Lincoln Meeting. The DAMOP Program Committee extends its appreciation and thanks to the Division of Condensed Matter Physics 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. More details will be given in the DAMOP November newsletter and will be found on the March Meeting home page at <http://www.aps.org>. The sorting categories for contributed papers have been expanded somewhat from those used in 2004, and we summarize them below. Note that for the invited nominations discussed above, only the major category (21) need be mentioned.

#### 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 BCS-BEC Crossover in Fermi gases(DAMOP)

21.16 Exotic Phase Transitions in Quantum Gases(DAMOP/DCMP)

21.17 Pathways to Practical Quantum Computing(DAMOP/DCOMP)

21.18 Computational Nanosciences ( DCOMP/DAMOP)

## NEW DAMOP MEMBERS OF NATIONAL ACADEMY OF SCIENCES

Two members of the DAMOP community were among the 72 new members recently elected to the National Academy of Sciences. **Phil Bucksbaum**, Otto Laporte Professor of Physics and director of the Center for Frontiers in Optical Coherent & Ultrafast Physics at the University of Michigan, and **Margaret Murnane**, Professor of Physics at the University of Colorado and Fellow of the Joint Institute for Laboratory Astrophysics in Boulder, Colorado were so chosen. Congratulations to Margaret and Phil on this prestigious honor!

## DAMOP ELECTION RESULTS

Congratulations to the newly elected officers of DAMOP. These are Tim Gay



(Vice Chair), Phil Gould and Debbie Jin (Executive Committee Members). This year DAMOP used the full electronic balloting system developed by the APS, and it appeared to go smoothly and easily. A total of 545 electronic ballots were supplemented by 35 paper ballots. This represents 23 % of the 2468 members of DAMOP at the time of voting, and is almost exactly the same participation as we have seen in recent years when only paper ballots were used. Apparently going electronic makes voting easier but not more probable.

## **SOME RECENT ACTIONS OF THE DAMOP EXECUTIVE COMMITTEE**

- Lucent Technologies has recently announced its intention to withdraw support for the Davison-Germer Prize. In response to this, the executive committee of DAMOP voted to try to fund the prize for the next round (this will be in 2006 for DAMOP) out of DAMOP operating funds. This is made possible partially by the relatively robust condition of the DAMOP treasury at present. In the meantime, a committee has been formed to study the establishment of an endowed DAMOP-centered career prize to continue the DG prize tradition. The committee will present a definite proposal at the executive committee meeting in 2005.
- The DAMOP thesis prize was raised to \$2500. This will take effect with the prize awarded at DAMOP05.
- DAMOP will experiment with the establishment of a Distinguished Speaker Program, similar to that sponsored by the DLS. Tim Gay, the new Publicity Committee Chair, will pursue this and make a definite proposal to the executive committee in 2005 for establishing a continuing program. The program is funded by DAMOP on a temporary basis until a more permanent plan is adopted. See following article in this newsletter.
- A proposal to host DAMOP08 at State College, PA was presented by the local committee from Penn State University, and was approved by the executive committee.

## **CALL FOR NOMINATIONS FOR THE INAGURAL DAMOP SPEAKERS BUREAU**

The Executive Committee decided this past May in Tucson to initiate a DAMOP Speakers Bureau, for the purpose of publicizing the excitement of cutting-edge AMO science in colleges and universities (and possibly a few high schools). DAMOP Speakers would travel to institutions that do not have an ongoing AMO program to talk about their own work and/or the latest hot developments in the field. An ulterior motive for these trips would be the shameless recruitment of bright young students for AMO physics. The Publicity Committee is seeking nominations for outstanding AMO scientists who are also superb public speakers. Once five or six of these individuals have been identified and have agreed to serve, we will publicize their availability nationally. DAMOP will pay travel expenses for speakers and may also help the host institution pay the speaker's local expenses. Please consider who among our colleagues would most effectively represent our field to those outside it, and then send your nominations to Tim Gay ([tgay1@unl.edu](mailto:tgay1@unl.edu)). In appropriate cases, do not hesitate to nominate yourself.

## **NEW AMOS PROGRAM MANAGER AT THE**

## DEPARTMENT OF ENERGY

Dr. Michael P. Casassa has joined the Chemical Sciences, Geosciences and Biosciences Division of the DOE Office of Basic Energy Sciences as the Program Manager of the Atomic, Molecular, and Optical Sciences Program. He received his B.S. in Chemistry from the University of Pittsburgh (summa cum laude, 1978), and his Ph.D. in Physical Chemistry from the California Institute of Technology (1984). He joined the research staff at the National Institute of Standards and Technology (then the National Bureau of Standards) in 1983 to develop laser-based methods to measure and characterize photophysics and ultrafast energy transfer processes in chemical systems. He later served as leader of the Laser Applications Group in NIST's Optical Technology Division (1995-1998), charged with developing laser-based measurement techniques to characterize industrially and environmentally important processes. More recently, Dr. Casassa served as the Director of the NIST Program Office (1998-2004), providing the NIST Director with technical, economic, and policy analyses and counsel, and facilitating NIST's program development and performance assessment. Dr. Casassa has received numerous honors and awards, including an NSF Graduate Fellowship, a NIST/NRC Postdoctoral Fellowship, the Arthur S. Flemming Award for Federal Scientists, and the Samuel Wesley Stratton Award for outstanding scientific achievement at NIST. He is the author of approximately 50 peer-reviewed articles, and is a member of the American Chemical Society, the American Physical Society, and Sigma Xi. Dr. Casassa can be reached at 301-903-0448 or by email at [michael.casassa@science.doe.gov](mailto:michael.casassa@science.doe.gov).

## DEPARTMENT OF DEFENSE RESEARCH FUNDING OPPORTUNITIES

The US Department of Defense has issued three solicitations for research proposals that should be of interest to the AMO physics community.

1. Multidisciplinary Research Program of the University Research Initiative(MURI). MURI programs are large grants, typically \$1M/year for three years. This year's announcement solicits proposals in at least two AMO-relevant topics: Quantum Imaging, and Detection and Sensing Below the Shot Noise Limit. White papers are due on August 12, 2004, and full proposals on November 18. For full information, see [http://www.onr.navy.mil/02/baa/docs/04\\_021.pdf](http://www.onr.navy.mil/02/baa/docs/04_021.pdf)
2. Defense University Research Instrumentation Program (DURIP). DURIP is designed to improve the capabilities of U.S. institutions of higher education to conduct research and to educate scientists and engineers in areas important to national defense, by providing funds for the acquisition of research equipment. Full proposals are due on August 26, 2004. For full information, see [http://www.onr.navy.mil/sci\\_tech/industrial/363/durip.asp](http://www.onr.navy.mil/sci_tech/industrial/363/durip.asp)
3. Experimental and Theoretical Development of Quantum Computers. The U.S. Army Research Office (ARO), together with the Advanced Research and Development Activity (ARDA), solicits proposals for experimental and theoretical studies relating to the possible physical realization of quantum computers and for achievement of effective computation on them. White papers are due August 25, 2004, and full proposals on November 2. For full information, see <http://www.aro.army.mil/research/qcbaa05.pdf>

## SPECIAL THANKS TO ...



## **OUTGOING COMMITTEE CHAIRS**

DAMOP could not function without the contributions of many committee chairs who render yeoman service quietly and efficiently throughout the year. Outgoing committee chairs to whom DAMOP owes major thanks include George Gibson, thesis prize committee chair; Mara Prentiss, Davisson-Germer Prize Chair; Ann Orel, Allis Prize Committee Chair; Wendell Hill, Nominating Committee Chair. Special thanks go also to Thad Walker, Education Committee, who has been writing the NSF proposals for student travel support to our annual meeting.

## **THOSE WHO PARTICIPATED IN LOBBYING AT DAMOP/DAMP 04**

Led by the efforts of David Cooper and Mike Lubell from the APS, a total of 1007 letters were sent to Congress from DAMOP/DAMP04. At an average of four letters per person, that is about 250 senders, roughly 37% of the attendees. This is a pretty strong showing considering that many attendees are not U.S. citizens. Special thanks go to those who were willing to “persuade” their passing colleagues to send letters. These include Lew Cocke, Phil Gould, Howard Camp, Kate Kirby, Joe Macek, Jim McGuire, Pat Richard, Allen Landers, Gordon Drake, Tim Gay, Jim Feagin, Dave Schultz, Charles Clark, Ann Orel, Tom Winter, Thad Walker and Lou DiMauro.

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[DAMOP Homepage](#)