

# ITAMP NEWS

HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS  
60 Garden Street, Cambridge, Massachusetts 02138

Spring 1998

## ITAMP Industrial Outreach coordinator among recipients of GOALI Grant

**J**im Babb, ITAMP's Industrial Outreach coordinator, announces that a team of Smithsonian and OSRAM SYLVANIA Inc. physicists have started working together on a project supported by a recent award from the NSF under the GOALI (Grant Opportunities for Academic Liaison with Industry) program. Babb as principal investigator, along with project investigators, Kate Kirby (ITAMP Deputy Director), W. Parkinson and K. Yoshino (Center for Astrophysics), and G. Lister and H. Adler (OSRAM SYLVANIA Inc.) will conduct the three-year study focusing on theoretical and experimental studies of line broadening in alkali-metal vapors and plasmas for lighting. The grant supports a unique opportunity to harness the research expertise in the ITAMP community to applications of industrial interest.

## Mandich and Delos join ITAMP Board

**I**TAMP is happy to announce that Dr. Mary Mandich of Lucent Technologies and Professor John Delos of the College of William and Mary have consented to join the Advisory Board of ITAMP. Special thanks go to retiring members Professor John Tully of Yale and Professor Lloyd Armstrong of the

University of Southern California. Continuing their tenure as board members are Dr. Kenneth Kulander of Lawrence Livermore, Dr. Peter Zoller of Innsbruck, Professor Gordon Drake of Windsor, and Professor Dan Kleppner of MIT.

## Participants from diverse disciplines enrich workshop discussions

**I**TAMP workshops exceeded expectations in providing a fertile environment for collaboration between scientists from many different backgrounds this past year.

The first workshop of 1997, **Classical Orbits and Interferences in Designer Atoms**, was held on April 24-26 and was organized by Joachim Burgdoerfer (Univ. of Tenn) and John Delos (William & Mary). Participants reported on work involving the dynamics of electrons in microstructures such as quantum dots and quantum corrals. In addition, researchers investigating quantum manifestations of chaotic dynamics, such as exhibited in Rydberg atoms subjected to strong fields, discussed their work.

On May 15-17, a workshop on **Dusty Plasmas** created an opportunity for scientists from the astrophysics and from the plasma processing communities to come together to exchange information. The workshop

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was organized by Tom Hartquist (Leeds) and Alan Garscadden (Wright-Patterson AFB). The focus of this workshop was the atomic and molecular physics of dust formation in both astrophysical and industrial plasmas.

Another successful collaborative effort was the workshop on **Resonances and Fragmentation of Three-Body Systems** organized by Anthony Starace (Nebraska) and Jan-Michael Rost (Freiburg) on July 10, 11 and 12. The primary purpose of this workshop was to bring together atomic and molecular physicists and chemists to discuss and compare their various approaches to the three-body problem. The talks on the three days included a full day devoted to resonance phenomena, both in atomic and in

molecular systems; a second day dealing with threshold laws and fragmentation of 3-body Coulomb systems; and a half-day session on intense laser field fragmentation of atomic and molecular systems followed by a session devoted to contributed talks. Numerous participants testified to the value of bringing atomic and molecular physicists and chemists together.

A workshop on **Manifestations of Electron Correlation**, held at ITAMP from October 30 to November 1 provided a unique venue for experimentalists and theorists who might otherwise not have communicated with each other to share their insights on the theoretical treatment of dynamical electron-electron correlation and experimental manifestations of these effects in atomic and molecular spectra. Recent major advances in theory and experiment, discretized continua for electrons, and recoil momentum spectroscopy were discussed in detail. Organizers Jim McGuire (Tulane) and Hossein Sadeghpour

## Forthcoming Workshops and Topical Groups

*Casimir Forces* (Topical Group) March 15-29, 1998, organized by Chi-Kwan Au (South Carolina), James Babb (ITAMP), Peter Milonni (Los Alamos) and Larry Spruch (NYU)

*Quantum Nonintegrability: Molecular Systems and General Theory*, April 30-May 2, 1998, organized by Steven Tomsovic (Washington State), Michel Vallieres (Drexel) and Jian-Min Yuan (Drexel)

*Threshold Phenomena* (Topical Group), Summer 1998, organized by Joseph Macek (Univ. of Tennessee and ORNL) and Ilya Fabrikant (Univ. of Nebraska)

*Atomic Cluster Physics* (Joint ITAMP/INT, Seattle), to be held in Seattle July 6-8, 1998, organized by George Bertsch and A. Bulgac (Univ. of Washington) and S. Berry (Univ. of Chicago)

*Wavelet Theory and Applications* (Joint Clark Atlanta Univ./ITAMP), organized by Romain Murenzi and Alfred Msezane (CAU) and Jean-Pierre Antoine (Catholic Univ. of Louvain, Belgium)

(Contact organizers directly for more information, but keep in mind that the number of participants as well as the budgets are limited.)

(ITAMP) felt that the 23 lectures and select number of participants provided a rich environment for the participants to communicate their understanding of the subject and present novel techniques for exposing the essential elements of the underlying physics.

### ITAMP continues topical group format in extended workshop

**A** Topical Group Workshop on **Experimental Realizations of Quantum Logic** ran at ITAMP from August 4-15 and was organized by Seth Lloyd (MIT). The topic of the workshop is currently the subject of intense and fundamental interest in both basic and applied sciences and the computer industry. Participants from the fields of engineering, computer science, medicine, NMR and AMO physics gathered for two weeks to discuss and devise new algorithms for studying quantum information and communica-

tion. A representative from the National Security Agency also attended. It was generally agreed that one- to two-bit quantum computation was fundamental and already realized. Three- to five-bit gates are necessary, however, to perform error-correction and communication.

## ITAMP workshop spawns international conference

**T**he first **International Conference on Atomic and Molecular Data and Their Applications (ICAMDATA)** was held at NIST September 29-October 2 and jointly sponsored by ITAMP. This conference had gotten its start at an ITAMP workshop, held in Cambridge in June 1996. Two of ITAMP's scientific staff lent their assistance. Alex Dalgarno was chair of the International Advisory Board for the Conference and Jim Babb served on the Conference Committee which developed the program for the meeting. An international group of Atomic and Molecular data users, data providers and those involved in developing and maintaining data bases participated in the meeting. The need for accurate atomic and molecular data for work in a number of scientific areas, including fusion, astrophysics and atmospheric physics, was highlighted. Examples of current atomic and molecular databases available over the world-wide web were featured. The next meeting in the series will take place in the United Kingdom in 1999.

## Wells takes post at ORNL; Timmermans at LANL

**I**TAMP's postdoc Jack Wells received a prestigious Wigner Fellowship at Oak Ridge National Laboratory. Wells left the Institute to join ORNL in August 1997 to pursue his research interests which include atom-strong field interactions as described in a time-dependent framework, and atomic physics phenomena at ultra-relativistic energies. Eddy Timmermans will be leaving his postdoctoral fellowship here in June to join the Los Alamos National Laboratory as a postdoctoral fellow in the Atomic and Optical Theory Group.

## Postdoctoral research proceeds with vigor at ITAMP

**T**he Institute provides an exciting and fertile environment for postdoctoral research and is much enhanced by the wide-reaching interests of the outstanding group of postdocs now at ITAMP. The latest to join the line-up is Brett Esry (Ph.D., Univ. of Colorado) who came aboard in November 1997. Continuing his tenure here is Robin Côté (Ph.D., M.I.T.), who is looking at ways to determine the scattering length for new trapping species such as potassium, and issues of cold molecule formation from trapped atoms using an optical pumping scheme. Other postdocs who received partial support from the Institute in 1997 included Bilha Segev (Technion, Israel), Zong-Chao Yan (Windsor, Ontario), and Hans Briegel (Munich).

### Visit the ITAMP web site and find!!

- Information on past and future ITAMP workshops and Topical Groups, Joint Atomic Physics Colloquia, informal AMP seminars, and Cold Atom Topical Group talks.
- A quick synopsis, "This week at ITAMP" which lists events scheduled for the present week, plus any visitors who may be arriving during the week.
- Information on upcoming workshops as it becomes available with a list of participants, the agenda, talk abstracts and relevant maps.
- A list of ITAMP staff, members and associates with their photographs.
- Incoming and future visitors consult the category "Living Accommodations," which contains the latest information we have on living accommodations in Cambridge and Boston.

### New Features Planned!!

Dining in Cambridge and future Open Houses.

Be sure to visit us at <http://itamp.harvard.edu>. Use our Search button to facilitate your browsing. And please give us feedback and suggestions.

## Macek lectures give intellectual stimulus to Visitors Program

**P**rofessor Joseph Macek, a visitor to ITAMP in the spring and summer of 1997, gave a series of lectures on hidden crossing theory and the application of Sturmian Theory to ionization and fragmentation.

Long- and short-term visitors to the Institute during 1997 were:

**Harald Friedrich**, Technische Univ. Munchen  
**Evelyn Roueff**, Observatoire de Paris  
**John Morgan**, University of Delaware  
**Peter Zoller**, University of Innsbruck  
**Alexei Ermolaev**, Université Libre de Bruxelles  
**Tamar Seideman**, Steacie Institute, NRC  
**Berthold-Georg Englert**, Universität Munchen  
**Joseph Macek**, University of Tennessee  
**Turgay Uzer**, Georgia Institute of Technology  
**Y.K. Ho**, Academia Sinica, Taipei  
**Sandra Ward**, University of North Texas  
**David Farrelly**, Utah State University  
**Colm Whelan**, University of Cambridge  
**Michael Murillo**, Los Alamos National Lab  
**Oleg Sushkov**, The Univ. of New South Wales  
**David Manolopoulos**, Oxford University  
**Maurice Cohen**, Hebrew University of Jerusalem  
**Brian Burrows**, Staffordshire University  
**Mauricio Pato**, Universidade de São Paulo  
**Michael Cavagnero**, University of Kentucky  
**Janine Shertzer**, College of the Holy Cross  
**Ilya Fabrikant**, University of Nebraska  
**Shih-I Chu**, University of Kansas  
**Victor Yakhontov**, Universität Heidelberg  
**Nikolai Manakov**, Voronezh State  
**Isao Shimamura**, RIKEN  
**Mahir Hussein**, Univ. of Sao Paulo

1998 visitors here and expected are:

**William Reinhardt**, University of Washington  
**Svante Jonsell**, Uppsala University  
**Piotre Froelich**, Uppsala University  
**Laurent Wiesenfeld**, Univ. Jos. Fourier de Grenoble  
**Chi-Kwan Au**, University of South Carolina

**Peter Milonni**, Los Alamos National Lab  
**John Black**, Chalmers University of Technology  
**Larry Spruch**, New York University  
**Jian-Min Yuan**, Drexel University  
**David Micha**, University of Florida  
**Mark Child**, University of Oxford  
**Bernard Zygelman**, University of Nevada  
**Robert Buenker**, Bergische Universität  
**Michael Jamieson**, University of Glasgow  
**Peter Schmelcher**, Univ. of Heidelberg

### A Message from the Director of ITAMP:

1997 was another busy year at ITAMP, and '98 will be too. Please check over the Web site for a full picture of past and upcoming activities.

MIT and Harvard have just submitted a joint pre-proposal for an NSF Science and Technology Center. ITAMP is involved as a subcontractor. The Center for Ultracold Atoms, if it comes to be, will be directed by Dan Kleppner and would further enhance the funding to AMO science in the US. The main thrust of the Center is on making very robust BEC condensates, coupling them "out" for use as cold and coherent atom sources, and then doing science with the sources (e.g. atom optics). ITAMP would play an important role as the host to new visitors and workshops associated with the Center. The Center has a strong educational component and we welcome the new challenges and chances to get the message out about AMO science to the public. Naturally we are hoping for broad AMO community support. I can get a copy of the pre-proposal to interested colleagues. Just let me know (heller@physics.harvard.edu).

As an AMO community resource our success depends in part on your ideas and input. We solicit proposals for workshops, topical groups, and long-term visitors, at any time of the year. The flow of requests for visits and ideas for workshops and topical groups has increased so much recently, that events are already scheduled into 1999.

Rick Heller

