



ITAMP NEWS

Spring, 2000

Director's Corner

As many of you know, Professor Rick Heller resigned as Director of ITAMP in August 1998 and now holds a Harvard professorship jointly in the Departments of Physics and Chemistry. We thank Rick for his leadership over the past five years and are pleased to have his continuing involvement in ITAMP programs. I am currently filling in as Acting Director during the course of our search for a new Director. After a lengthy evaluation process, involving input from the Advisory Board and members of the community, an offer was made to the first choice candidate. Following considerable discussions and negotiations, the offer was recently declined. We are currently assessing our next step.

ITAMP continues to thrive--as evidenced by the many accomplishments described in this Newsletter. Our postdocs are truly exceptional physicists who are making excellent use of the research opportunities here in Cambridge. The Institute continues to organize five or six workshops per year in AMO physics and to host a number of leading theorists to visit ITAMP to study, discuss, and collaborate.

One of our primary goals is to serve the theoretical AMO community and we welcome your proposals for future workshops, long-term visitors and programs. Our success depends in large part on your interest and support.

Kate Kirby

Academia beckons ITAMP postdocs

The summer of 1999 saw an exodus of ITAMP postdocs to assistant professor positions around the country. Drs. Robin Côté, Brett Esry, Robert Forrey and Maxim Ol'Shanii all left ITAMP to assume tenure-track positions in leading United States universities. Côté (1996-99) received an offer during his second year as a postdoc at the Institute, remained for a third year at ITAMP, and then left to take a position at the University of Connecticut. Esry (1997-99), also receiving an offer during his second year here, is now in the Physics Department at Kansas State University. ITAMP-affiliated postdoc and former ITAMP pre-doc, Forrey, is an assistant professor of physics at Penn State University-Reading. An ITAMP-affiliated postdoc working with the group of Professor Mara Prentiss in the Harvard University Physics Department, Ol'Shanii is now an assistant professor in the Physics Department at University of Southern California.

Other recent postdoctoral fellows who were affiliated with ITAMP and who are now in academic positions are Dr. Bilha Segev in the Department of Chemistry at Ben-Gurion University of the Negev in Israel, and Dr. Zong-Chao Yan, an assistant professor in the Department of Physics at the University of New Brunswick in Canada.

Institute for Theoretical Atomic and Molecular Physics

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Tune in to ITAMP workshop talks

Just over one year ago, ITAMP initiated a program to make workshop presentations available on-line. The audio files together with the viewgraphs are available for listening and viewing through the ITAMP website. While it is not mandatory, we do encourage speakers to agree to have their talks recorded, so that the wider community can benefit from ITAMP workshops.

The ITAMP website can be accessed at <http://itamp.harvard.edu>.

Postdocs garner awards

Two ITAMP postdocs, Dr. Brett Esry and Dr. Mikhail Lukin, have received awards in recognition of their outstanding work in the field of physics. Esry shared the 1999 DAMOP Most Outstanding Thesis Prize in AMO Physics with Dr. Jens Noeckel of the Max-Planck Institute at the APS Centennial meeting in Atlanta in March, 1999. Esry's thesis work on "Many-body effects in Bose-Einstein condensates of dilute atomic gases" was carried out with Prof. Chris Greene at JILA/University of Colorado.

Second-year ITAMP postdoc Lukin has been selected to receive the Adolph Lomb Award of the Optical Society of America for "outstanding contributions to optics by a person under the age of 30." Lukin, who obtained his Ph.D. from Texas A&M working in the group of Prof. Marlan Scully, will be honored at the October, 2000, meeting of the Optical Society.

New ITAMP postdoctoral fellows

The competition for ITAMP postdoctoral appointments remains exceptionally strong, with one new postdoc fellowship appointment made each year.

Dr. Mikhail Lukin and Dr. Ami Vardi joined us in 1998 and 1999, respectively, and this year's postdoctoral fellow, Dr. Michael Moore, will arrive in Cambridge in October, 2000. The normal tenure for the appointment is 3 years.

Lukin arrived in the summer of 1998 from Prof. Marlan Scully's group at Texas A&M. Lukin's research has generally involved the use of quantum coherence and interference effects in the study of optical phenomena, such as lasing without inversion and electromagnetically induced transparency. He has also been working on the physics of quantum entanglement and quantum information processing, and nonlinear optics and spectroscopy in dense

coherent media.

In September 1999, Vardi joined the Institute from Professor Moshe Shapiro's group at the Weizmann Institute, Israel. Vardi has explored various schemes for coherent population transfer to and from the continuum, including the production of ultracold molecules via stimulated photoassociation of cold atoms. Together with ITAMP visitor Dr. James Anglin, Vardi has been working on the dynamics of a two-mode Bose-Einstein condensate.

The new ITAMP postdoctoral fellow this year, Moore, joins us from Professor Pierre Meystre's group at the University of Arizona, having completed his Ph.D. thesis on "Nonlinear wave mixing between atomic and optical fields." As an undergraduate at Delaware, Moore worked with Prof. R. Blumel on classical and quantum chaos in ion traps.

Dr. Susanne Yelin (Ph.D. Ludwig-Maximilians-Universitaet, Munich) began her ITAMP postdoctoral affiliation in September 1999 with partial support from a von Humboldt fellowship, and from the Air Force Research Laboratory. Her research is in the general area of coherence effects in atomic and quantum well systems.

Ph.D. Recipients

Recent ITAMP predoctoral fellows, Sean Comett and William Hoston, received their Ph.D. degrees during the past year. Comett (Univ. of Kentucky), working with Prof. Michael Cavagnero (long-term visitor to ITAMP 1997-98) and Dr. Hossein Sadeghpour (ITAMP) wrote his thesis on "Interferometric lineshape modulations in alkali-halide photodissociation" and obtained his Ph.D. in August 1999. MIT graduate student Hoston, working with Prof. Eric Heller, completed his Ph.D. thesis on "Theoretical studies in Bose-Einstein condensates" in September 1999.

Update on former ITAMP postdocs

Two former ITAMP postdocs who have chosen to take research positions in government laboratories are Dr. Jack Wells (1994-97) and Dr. Eddy Timmermans (1995-98). Wells has a staff scientist position at Oak Ridge National Laboratory working in the Computational Nanotechnology group. Timmermans now holds the J. Robert Oppenheimer fellowship at Los Alamos National Laboratory, working in T-Division on a number of aspects of Bose-Einstein condensation.

Industrial Outreach program continues bridge to industry

As part of an effort to establish links between scientists working in industry and ITAMP, Dr. Jim Babb continues as PI. on a project supported by the NSF under the GOALI (Grant Opportunities for Academic Liaison with Industry) initiative. The project has focused on the theory and experiment of pressure-broadened absorption in alkali-metal vapor and inert gas mixtures. Scientists from Osram-Sylvania Inc. have joined with Babb, Kirby and other scientists at the Center for Astrophysics in pursuing this work. In 1998, Dr. Hyun-Kyung Chung (Ph.D., U. of Wisc.) and Dr. Max Shugalin (Ph.D., Brisbane) joined the research team as postdoctoral scientists.

Undergraduate Research

ITAMP has supported the research activities of several undergraduate students. Jacob Taylor (Harvard, Astronomy) worked with Dalgarno and Babb on calculations of nonadiabatic effects in the hydrogen molecular ion. He will spend next year in Japan working with Prof. J. Makino (Univ. Tokyo) and then will return to the Harvard Physics Department for graduate work. During the summer of 1999, Marianne Viera (U. Rochester) carried out research with ITAMP members on collisions of He and H₂, which was published and she is now an Astronomy graduate student at the Univ. of Virginia.

Elena Seigueeva (U. of Virginia) worked on problems relating to terrestrial and planetary atmospheres during the summer of 1999 with Dalgarno and Balakrishnan. She will return to ITAMP this summer.

Joint workshops add dimension

The years 1998 and 1999 were very productive with ITAMP organizing and hosting six workshop between September 1998 and August 1999, several of which were held jointly with other institutes. These included:

Wavelets and Their Applications in Physics and Astrophysics held at ITAMP 8-10 October, 1998, jointly with the The Center for Theoretical Studies of Physical Systems at Clark-Atlanta University. Organizers were A. Msezane (CAU), R. Murenzi (CAU) and J-P Antoine (Catholic Univ. of Louvain)

Hyperspherical Harmonic Methods in Atomic, Molecular and Nuclear Physics held jointly with the Institute for Nuclear Theory at the University

of Washington in Seattle on 25-29 January, 1999, and organized by J. Macek (Tennessee), G. Parker (Oklahoma), and S. Rosati (INFN-Pisa).

Quantum Information Processing and NMR held jointly with MIT and Los Alamos National Lab at ITAMP 22-24 February, 1999, and organized by R. Walsworth (CfA), D. Cory (MIT) and R. LaFlamme (LANL).

The Role of Theory in AMO Physics at ITAMP 26-27 February, 1999. This workshop was organized by TAMOC officers K. Bartschat (Drake Univ.) and M. Cavagnero (Univ. of Kentucky). Participants were elected by a TAMOC ballot to try to ensure representation within the community.

The Geometric Phase: Recent Developments and Applications in AMO Physics, at ITAMP, 24-26 April, 1999, and organized by B. Zygelman (UNLV) and R. Littlejohn (U.C. Berkeley).

Trapping, Spectroscopy and Collisions of Ultracold Molecules, at ITAMP, 1-3 July, 1999; organized by R. Forrey (ITAMP) and J. Doyle (Harvard). This was the first workshop on ultracold molecules held in the U.S.

1999-2000 Workshops

ITAMP's busy workshop schedule continued in the fall of 1999 and into 2000 with the following workshops:

Fragmentation and Recombination in Novel 3- and 4-Body Systems held at ITAMP 4-6 November, 1999 and organized by B. Esry (KSU) and C.D. Lin (KSU).

Multi-Component and Spinor Bose-Einstein Condensates held jointly with Rochester Theory Center at Rochester 6-8 January 2000; organized by E. Timmermans (LANL) and N. Bigelow (Rochester).

Physics and Applications of "Slow" Light held at ITAMP 3-5 April 2000 and organized by M. Lukin (ITAMP), A. Imamoglu (UC-SB) and L. Hau (Harvard U. and Rowland Inst.).

Computational Challenges in Atomic and Molecular Physics at ITAMP 4-6 May 2000; organized by M. Pindzola (Auburn U.), C.W. McCurdy (LBL) and K. Kirby (ITAMP).

Upcoming workshops

Relativistic and QED Effects in Few-Electron Atoms at ITAMP 17-21 July, 2000; organized by G. Drake (Windsor) and I. Grant (Oxford).

Cold Alkali-Earth Atoms, at ITAMP 7-9 September, 2000; organized by P. Julienne (NIST), K-A. Suominen (Helsinki) and N. Andersen (Copenhagen U.).

Positron and Positronium Interactions: New

Directions at ITAMP 21-14 October, 2000; principal organizers, C. Surko (UCSD), F. Gianturco (Rome) and D. Schrader (Marquette).

ITAMP visitors program

The ITAMP Visitors Program continues to receive accolades from participants. Especially appreciated and mentioned by numerous visitors is the stimulus to their research from interaction and discussions with ITAMP physicists, postdocs and other visiting scientists and the rich source of information provided by ITAMP seminars and workshops. We welcome and encourage applications for an ITAMP visit from members of the theoretical AMO community.

Long-term visitors: 1998-1999

Piotr Froelich (Uppsala University)
Peter Milonni (Los Alamos National Lab)
Bernard Zygelman (UNLV)
Robert Buenker (Wuppertal University)
Michael Jamieson (University of Glasgow)
Rex Skodje (University of Colorado)
Sandra Ward (University of North Texas)
K. T. Chung (NCSU)
Yehuda Band (Ben Gurion University)
Evgenii Nikitin (Technion)
Elena Dashevskaya (Technion)
Michael Fleischhauer (Universitaet Muenchen)

Many other short term visitors participated in workshops at ITAMP.

Long-term visitors: 1999-2000

James Anglin (Innsbruck)
Verne Jacobs (NRL)
Dennis Clougherty (University of Vermont)
Uwe Thumm (KSU)
Fred Mies (NIST)
Chris Greene (U. Colorado)
David Micha (University of Florida)

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Thanks to ITAMP Advisory Board

The Advisory Board to the Institute serves a very important function--providing valuable advice to the ITAMP staff and a vital link between the theoretical AMO community and ITAMP. The Advisory Board met in Cambridge May 1 and 2, 2000. Attending were: Prof. Peter Zoller (Innsbruck), Dr. Ken Kulander (LLNL), Dr. Mary Mandich (Lucent), Prof. John Delos (College of William & Mary), Prof. Jim McGuire (Tulane) and Prof. Steve Lundeen (Colorado State). The Advisory Board heard presentations by ITAMP graduate students and postdocs, and reviewed past and future workshops and visitors to ITAMP. Advisory Board members serve a 3-year term. Retiring members, Zoller and Kulander, will be replaced by Prof. Chris Greene (U. Colorado/JILA) and Prof. Pierre Meystre (U. of Arizona). We thank all of them for their support and work on behalf of ITAMP.

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