



Winter School 2013

January 4-11
B2 Institute
University of Arizona
Tucson, AZ



2013 Benjamin Franklin Medal in Physics
Alexander Dalgarno
Philadelphia, PA

AMO THEORY INPUT WANTED

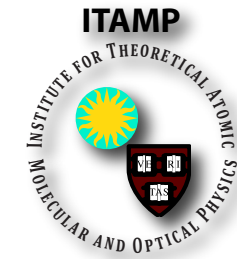
Have an idea for a workshop you want to organize? Have some sabbatical time? Would you like to bring a group of people together? ITAMP can make it happen.

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ITAMP News

Harvard-Smithsonian Center for Astrophysics
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FALL 2013

Workshops, Topical Groups, & Schools

Theory of electron-molecule collisions for astrophysics, biophysics, and low temperature plasmas: Opportunities and challenges. Organizers: Viatcheslav Kokouline Central Florida Univ., Chris Greene, Purdue, December 3-5, 2012.

ITAMP/B2 Institute Winter Graduate School on AMO Physics, at University of Arizona- Biosphere 2, Tucson, Arizona, January 4-11, 2013

Finite temperature and low energy effects in cold atomic and molecular few- and many-body systems

Organizers: Doerte Blume, Washington State, Barbara Capogrosso-Sansone, University of Oklahoma, Seth Rittenhouse, Western Washington University, March 25-27, 2013

Ultracold Rydberg Physics: A collaborative workshop

Organizers: Thomas Pohl and Jan M. Rost, MPIPKS, Dresden, Germany, July 8-12, 2013

Workshop: "Quantum Applications with Trapped Ions" Sep.16-18

Topical Group Discussion: "Scalable Trapped Ion Quantum Systems" Sep. 19-25

Organizers: Peter Rabl, TU Vienna & Chris Monroe, JQI

Synthesis and spectroscopy of large carbon molecules

Organizers: Michael McCarthy, CfA and Hossein Sadeghpour, ITAMP, October 21-23, 2013

Ultrafast atomic and molecular physics with cutting edge light sources: New opportunities and challenges

Organizers: Brett Esry, Kansas State, Vinod Kumarappan, Kansas State, Mark Vrakking, Max-Born-Institute, November 4-6, 2013

ITAMP/B2 Institute Winter Graduate School on AMO Physics, at University of Arizona- Biosphere 2, Tucson, Arizona, January 4-12, 2014

From atomic to mesoscale: The role of quantum coherence in systems of various complexities

Organizers: Svetlana Malinovskaya (Stevens Institute), Irina Novikova (William & Mary), and Christian Buth (Argonne Nat'l Lab), March 3-5, 2014

2013 Benjamin Franklin Medal in Physics



Professor Alexander Dalgarno

We are pleased that Alex Dalgarno, founding director of ITAMP, was awarded the 2013 Benjamin Franklin Medal in Physics. He traveled to the Franklin Institute in Philadelphia in April 2013 to receive the medal. The prize citation reads:

"For his many fundamental contributions to the development of the field of molecular astrophysics, which led to a better understanding of interstellar space, including the giant molecular clouds that are the birthplaces of stars and planets."

SEND YOUR STUDENTS TO THE ITAMP/B2 INSTITUTE 2014 WINTER SCHOOL!

The ITAMP/B2 Institute Winter Graduate School on AMO Physics co-sponsored with the University of Arizona- Biosphere 2, Tucson, January 4-12, 2014. Visit www.cfa.harvard.edu/itamp/winterschool2014.html

2013 Postdoctoral Fellows

Eric Kessler received his master's degree in physics at Michigan State University in 2007 and his



PhD in theoretical quantum optics in the group of Ignacio Cirac at the Max-Planck-Institute in Munich (Germany). During his studies he worked on the description of open quantum system, coherent nuclear spin dynamics in semiconductor nanostructures, and quantum phase

transitions.

After he joined ITAMP in April 2013 his research focus moved towards the integration of concepts from open quantum dynamics and solid-state quantum information processing for application in quantum metrology, e.g., in the context of neural network activity mapping and quantum clock networks.

Michael Knap joins ITAMP from Graz University of Technology, Austria, where he developed numerical techniques to explore spectral properties of strongly correlated lattice bosons and non-equilibrium steady states. He is especially interested in understanding the nonequilibrium dynamics of strongly interacting many-particle systems and the novel phenomena that emerge from the collective behavior of the particles. Currently his research is at the interface between many-body physics and atomic physics.



After receiving his diploma in physics at the University Heidelberg, **Richard Schmidt** moved to the group of Wilhelm Zwerger at the Technical University Munich where he earned his Ph.D. in physics. His dissertation deals with the application of functional renormalization group techniques to strongly

interacting ultracold quantum gases, including non-universal aspects of the Efimov effect, four-body bound states, and polaron physics in two and three dimensions. His main current research interests are Bose-Fermi mixtures, the renormalization group study of competing orders, and the spin-imbalanced Fermi gas. At ITAMP, he plans to work on the interplay between few- and many-body physics in systems far from thermal equilibrium.

Long Term Visiting Fellows

Doerte Blume (Washington State University)
Alexander Dodonov (Institute of Physics, University of Brasilia)
Brett Esry (Kansas State University)
Roberto Onofrio (University of Padova)
Janine Shertzer (Holy Cross)
Ronnie Kosloff (Hebrew University, Jerusalem)
Nimrod Moseyev (Technion Israel Institute of Technology, Haifa)
Peter Schmelcher (University of Hamburg)
Mei Zhang (Chinese Normal University)

2013 Winter School

The Winter Graduate School has had its second year of great success. ITAMP and the B2 Institute in Arizona organized an eight day graduate school in AMO physics, January 4-11, 2013. The main topic was quantum control of mesoscopic systems. The B2 Institute campus, where the winter school is held, is located at the bottom of the Catalina Mountains near Tucson. Students attended the school from all over the world. Particular attention was paid to recruiting students from under-represented schools. The next Winter School on "**Ultracold Rydberg physics and engineering**", will be **January 4-12, 2014**. The lectures of the past winter schools are available on the ITAMP YouTube channel.

ITAMP News (In Brief)

In 2013, ITAMP organized the Second Winter School with the B2 Institute, 3 workshops and a topical Group at ITAMP and a joint workshop with Kansas State University is planned for November. During the '12-'13 academic years, ITAMP and HQOC supported 12 speakers from all over the world, and 8 seminars were held in collaboration with Harvard's Chemistry and Chemical Biology Department. In addition, 8 long-term visitors, and more than 30 short term visitors/speakers visited ITAMP both in the Harvard Physics Department and at the Harvard-Smithsonian Center for Astrophysics.

Brett Esry, was awarded a 2012-13 Simon Foundation Fellowship, and spent 6 weeks of his sabbatical at ITAMP in late 2012 working on ultracold and ultrafast physics.

Susanne Yelin was awarded the Lamb Award for Laser Sciences with Shaul Mukamel (UC-Irvine) and Peter Nordlander (Rice). The Lamb Award is sponsored by the Physics of Quantum Electronics Conference (PQE).

Advisory Board Meeting

The Advisory Board met on November 8-9, 2012. The new member of the board is Doerte Blume from Washington State University.

ITAMP collaborates with German Institutes

ITAMP continues its longstanding collaborative research with MPIPES in Dresden. In May 2012, new collaborations with The University of Hamburg, Center for Free-electron Laser (CFEL) and The Center for Quantum Technologies (ZQ) were initiated.

ITAMP YouTube Channel

The ITAMPPhysics YouTube channel (www.youtube.com/itamphysics) is going strong with over 41,000 views. The uploaded videos from workshops and the Winter School can be viewed on this channel.

Farewell

Chris Laumann is planning to spend three months this fall as a visitor scholar at the Perimeter Institute in Waterloo, ON before starting as an Assistant Professor at the University of Washington in Seattle in January. He is joining the condensed matter theory faculty and will be working on various topics in quantum condensed matter, cold atoms and information theory.

Workshop Updates

June 2012 - Quantum Simulations

A small focused group met for a week to discuss the frontier where research in quantum computing meets theoretical chemical dynamics. The workshop aimed to survey experimental and algorithmic approaches for quantum simulations of chemical dynamics and to couple this to some developing quantum hardware technologies including simulation fidelity, coherence times, qubit-scaling, architecture, bus, and memory storage.

December 2012 - Theory of Electron-Molecule Collisions for Astrophysics, Biophysics, and Low Temperature Plasmas

A fairly large workshop on electron-molecule collisions bringing together theorists and experimentalists from atomic, molecular, chemical, biological, and astrophysical backgrounds, as well as physicists providing databases, was held at ITAMP in December. Topical problems in biophysics, tokamak edge plasma, as well as in astrophysics, require accurate electron-molecule collisional data over vast energy scales (1 meV-100 eV). In particular, data (cross-sections, rate coefficients, branching ratios) are urgently needed for collisions of electrons with vibrationally excited molecules. The workshop successfully included members from the quantum chemistry community to forge future collaborations and to exchange ideas.

March 2013 - Finite temperature and low energy effects in cold atomic and molecular few- and many-body systems

Long-term visitor Doerte Blume (Washington State) and former ITAMP postdoctoral fellows Barbara Capogrosso-Sansone (Oklahoma) and Seth Rittenhouse (Western Washington) organized a successful workshop that brought together theorists and experimentalists who work on cold atom systems and share an interest in finite temperature effects. Challenges in the theoretical description of systems which sit between "few" and "many" bodies as well as connections between atomic, molecular, and optical and condensed matter physics were explored.