

Instrument and Measurement Science

JANUARY 2010

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<http://units.aps.org/units/gims>

The Topical Group on Instrument and Measurement Science (IMSTG/GIMS) of the American Physical Society was formed in 1984 to encourage precision in measurements, to encourage development of instrument and measurement science, to provide a forum for discussions of these topics, and to provide professional recognition of the importance of instrument and measurement science.

The articles in this issue represent the views of the GIMS publication committee and are not necessarily those of individual GIMS members or the APS.

I. APS Keithley Award for 2009

Eugene Ivanov

University of Western Australia

Citation: *For advances in microwave interferometry, ultra-low phase noise microwave oscillators and high resolution noise measurement and for elucidation of noise mechanisms affecting the fidelity of optical to microwave frequency transfer.*

II. APS/GIMS Fellows for 2009

Hannahs, Scott T.

Florida State University

Citation: *For his contributions to instrumentation and measurements in high magnetic fields and for scientific contributions to many fields including quantum fluids, organic superconductors, heavy fermions, quantum Hall effect, and Heisenberg spin systems.*

Mills, Dennis M.

Argonne National Laboratory

Citation: *For the development of synchrotron x-ray optics and related techniques and for the build-out of beamlines at the Advanced Photon Source. In particular for the development of x-ray monochromators, phase plates, and timing techniques. For his guidance at the Journal of Synchrotron Radiation and for initiating the National Neutron and X-ray School.*

III. GIMS Selection Committees

APS Keithley Award

2009 J. Matey (chair), T. Graber, R. Floyd, R. Schoelkopf, A. Macrander
2010 T. Graber (chair)

APS/GIMS Fellowship

2009 Eric Hudson (chair), J. Stroschio
2010 Eric Hudson (chair), R. Floyd, A. Heinrich, S. Mini

IV. GIMS Sessions at March 2010 Meeting in Portland, Oregon

A. GIMS INVITED SYMPOSIA

Session T4: Keithley Award Session: Precision Time and Frequency Measurements

Chair: James Matey

Room: *Oregon Ballroom 204*

Wednesday, March 17, 2010

2:30PM–3:06PM

T4.00001: Joseph F. Keithley Award For Advances in Measurement Science Talk: *Precision Noise Measurements at Microwave and Optical Frequencies*

Invited Speaker: Eugene Ivanov

Wednesday, March 17, 2010

3:06PM–3:42PM

T4.00002: *Toward Robust, Stable, and Accurate Single Atom Optical Clocks*

Invited Speaker: James Bergquist

Wednesday, March 17, 2010

3:42PM–4:18PM

T4.00003: *Optical Lattice Clocks Based on Neutral Yb Atoms*

Invited Speaker: Chris Oates

Wednesday, March 17, 2010

4:18PM–4:54PM

T4.00004: *Tests of Lorenz and Local Position Invariance using Microwave Oscillators and Interferometers*

Invited Speaker: Michael Tobar

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GIMS Sessions at March 2010 Meeting in Portland, Oregon cont'd

Wednesday, March 17, 2010

4:54PM–5:30PM

T4.00005: *Modern Laser-Atomic Physics and Stable Oscillators for Real World Applications*

Invited Speaker: Leo Hollberg

Session W8: Scanned Probe Microscopy of Novel Materials and Systems

Chair: Joseph Stroschio

Room: *Portland Ballroom 255*

Thursday, March 18, 2010

11:15AM–11:51AM

W8.00001: *Quantized spin-momentum transfer in atom-sized magnetic systems*

Invited Speaker: Sebastian Loth

Thursday, March 18, 2010

11:51AM–12:27PM

W8.00002: *Scanning Tunneling Microscopy of Complex Magnetic Order*

Invited Speaker: Andre Kubetzka

Thursday, March 18, 2010

12:27PM–1:03PM

W8.00003: *Scanning Tunneling Microscopy and Spectroscopy of Iron-Based Superconductors*

Invited Speaker: Jennifer Hoffman

Thursday, March 18, 2010

1:03PM–1:39PM

W8.00004: *Kondo effect of bulk impurities studied with electron focusing*

Invited Speaker: Martin Wenderoth

Thursday, March 18, 2010

1:39PM–2:15PM

W8.00005: *Charge Measurement of Atoms and Atomic Resolution of Molecules with Noncontact AFM*

Invited Speaker: Leo Gross

B. GIMS FOCUS AND REGULAR SESSIONS (110 talks)

Monday 11:15–2:15, Session B15

GIMS Focus Session: *Advances in Scanned Probe Microscopy I: Novel AFM, MRFM, and Acoustic Microscopy*, 13 talks

Chair: Franz Giessibl, Room: *B114*

Invited Speaker: Sergei Kalinin

Monday, 2:30–5:30, Session D15

GIMS Focus Session: *X-ray and Neutron Instruments and Measurement Science I*,

13 talks, Chair: Susan Mini, Room: *B114*

Invited Speaker: David Fritz

Tuesday 11:15–2:15, Session J15

GIMS Focus Session: *Advances in Scanned Probe Microscopy II: Optical Techniques*,

13 talks, Chair: Andreas Heinrich, Room: *B114*

Invited Speakers: Hidemi Shigekawa

Tuesday 2:30–5:30, Session L15

GIMS Focus Session: *X-ray and Neutron*

Instruments and Measurement Science II, 15 talks, Chair: Timothy Graber, Room: *B114*

Wednesday 8:00–11:00, Session P15

GIMS Regular Session: *Instrumentation for Nanoscale Science*, 15 talks,

Chair: Young Jae Song, Room: *B114*

Wednesday 11:15–2:15, Session Q15

GIMS Focus Session: *Advances in Scanned Probe Microscopy III: Spectroscopic*

Techniques at Low Temperatures, 13 talks,

Chair: Yukio Hasegawa, Room: *B114*

Invited Speakers: Young Jae Song

Thursday 8:00–11:00, Session V15

GIMS Focus Session: *Novel Instrumentation and Measurements for Medical and Biological Systems*, 13 talks,

Chair: Larry Nagahara, Room: *B114*

Invited Speakers: N.J. Tao

Friday 8:00–11:00, Session Y15

GIMS Regular Session: *Detectors, Sensors, and Transducers*, 15 talks,

Chair: Sander Otte, Room: *B114*

V. GIMS Business Meeting

GIMS Business Meeting will follow the Keithley award session and in the same room.

Wednesday 5:45PM, Session U4

GIMS Business Meeting

Room: *Oregon Ballroom 204*

This meeting will be lightly catered in lieu of the traditional GIMS dinner. Please note that the day of the meeting has been moved to Wednesday instead of Tuesday as in previous years. This was done to permit members to attend University Alumni get togethers which have conflicted in previous years.

VI. Student Travel Awards

Reimbursement of travel expenses to the March meeting are available for student presenters at any GIMS sponsored session. The GIMS secretary treasurer, A. Macrander macrander@gmail.com, should be contacted before the meeting to give advance notice, and all travel receipts should be save for subsequent submission to the APS for reimbursement.

VII. Next GIMS Election

An election for Vice Chair is planned. The GIMS Nominating Committee consists of the GIMS Executive Officers and is recruiting candidates.

VIII. Treasurer's Report

As of 11/30/2009

Revenue

Dues-APS	\$2830
March meeting share	\$2026
Allocated investment income	\$3944
Total Revenue	\$8800

Expenses

Newsletter Printing	\$1173
Postage	\$77
Overnight mail	\$19
Mailing service expense	\$449
Meeting travel grants	\$7000
Meeting fee waivers	\$315
Committee Meetings Meals	\$1769
Non-staff travel	\$2000
Total Expenses	\$12803

REVENUE – EXPENSES = (\$4003)

IX. Results of GIMS Election Held March-April 2009

For Vice Chair: Eric Hudson
 For Member at Large: Rachel Floyd, Susan Mini

X. Current GIMS Governance

Chair: Timothy Graber (03/09–02/10)
Univ of Chicago

Chair-Elect: Joseph Stroschio (03/09–02/10)
Natl Inst of Stds & Tech-NIST

Vice Chair: Eric Hudson (03/09–02/10)
Massachusetts Inst of Tech-MIT

Past Chair: Charles Agosta (03/09–02/10)
Clark Univ

Secretary/Treasurer: Albert Macrander
 (03/08–02/11)
Argonne Natl Lab

Member-at-Large: George Gillies
 (03/08–02/11)
Univ of Virginia

Member-at-Large: Andreas Heinrich
 (03/08–02/11)
IBM Almaden Res Ctr

Member-at-Large: Daniel Rugar
 (03/08–02/11)
IBM Almaden Res Ctr

Member-at-Large: Keith Schwab
 (03/08–02/11)
Cal Inst of Tech (Caltech)

Member-at-Large: Rachael Floyd
 (03/09–02/12)
Janis Research Co Inc

Member-at-Large: Susan Mini
 (03/09–02/12)
Northern Illinois Univ

XI. Notes from GIMS Business Meeting in Pittsburgh, March 17, 2009

- 1) Emails should be sent to GIMS membership to remind people to nominate for election candidates
- 2) Email should be sent to GIMS membership roughly 3 weeks before the abstract due deadline for the March meeting
- 3) There should be a \$500 limit on travel reimbursement for students
- 4) The business meeting should be held right after the Keithley session.
- 5) A focus session on biomedical topics was proposed by L. Nakahara

XII. Text of Article featuring GIMS in March 2009 issue of APS News

Group on Instrument and Measurement Science

By Michael Lucibella

This year's March Meeting marks the twenty-fifth anniversary of the Group on Instrument and Measurement Science (GIMS), where they will celebrate their quarter century with a tribute to the group's founder Lawrence Rubin.

As its name implies, the primary focus of GIMS is promoting the development and dissemination of the best tools and techniques for making all classes of precise measurements. Because the need for accurate data is integral to all fields of science, members of GIMS represent a broad cross-section of disciplines.

Innovations from the instrumentation and measurement technologies have had a huge impact in every scientific field. Laboratory applications are constantly pushing the cutting edge of research and spurring innovation. Devices such as the boxcar integrator and the lock-in amplifier which were just making their debuts when the group was starting are now commonly found in labs around the world.

Outside of pure scientific research, developments from the field can be seen in a wide assortment of practical applications as well. Medical technologies, such as MRIs, PET and CAT scans all depend on the sort of precise instrumentation that emerges from the cutting edge of GIMS research. This ability to precisely scan and interpret data is used in countless commercial electronics ranging from cell phones to television sets.

The group's membership often reflects where the major fields of study are in physics today.

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Text of Article featuring GIMS in March APS News *cont'd*

Anyone with an interest in measurement science can join GIMS, so the most popular disciplines tend to have the largest numbers of members in the group. Some of the most prominent areas of specialization include research into all manner of scanning probes, synchrotron radiation instruments and high-field magnets. In addition, technicians devising new technologies for low temperature physics and acoustic and photo-thermal research play a major role, reflecting the constant need for new techniques in these fast-moving fields.

Founder Lawrence Rubin said that he originally conceived of the group as a forum where the latest research about instrumentation and measurement techniques could be shared. At the time he saw information about the different techniques of measurement scattered across numerous different fields of physics.

“The whole idea is to get publicity to newer techniques and newer equipment,” Rubin said, “Lord Kelvin once made the statement that if you can’t measure something you don’t know anything about it.”

One of the original inspirations for the group came when Rubin was working at the High

Field Magnet Lab at MIT. During his time there, he saw what he described as many thousands of people who had come to test their experiments within the powerful magnetic fields generated at the lab. He took notice of the need for precision measurement that all of the experimenters shared. In addition he served as an associate editor at the Review of Scientific Instruments, a publication devoted to scientific instruments and techniques. He was struck by the need for a dedicated organization for physicists and technicians to come together to share their research.

When GIMS was founded it was the first APS topical group. Rubin continued to work closely with RSI to help publicize the latest research, and remained active in GIMS until his retirement in 2004. Rubin said that though the technology may have changed over the years, the group’s direction has always stayed true to its original focus on bringing the newest and best information to its members.

Today the group comprises over 600 members, many of whom are expected to attend the annual March Meeting. One of the major highlights at each of the meetings is the presentation of the Joseph F. Keithley Award for Advances in Measurement Science, given each year to an individual who has made a

major contribution to the field. This year APS will be honoring Robert Schoelkopf of Yale for developing the single electron transistor to better take high frequency mesoscopic measurements.

In addition, GIMS continues to promote the latest research and developments through the journals it keeps a close association with. Al Macrander, former Chair and the current Secretary Treasurer, is also the current head editor of RSI, continuing the group’s close affiliation with the Review. In addition, member Carolyn MacDonald serves as the editor-in-chief of X-ray Optics and Instrumentation.

“GIMS has reached out indirectly to instrumentalists and young scientists by facilitating personal contact with journal editors,” Macrander said, adding that it maintains a close connection with the Keithley Company as well.

Macrander said they are expecting over 200 members to attend the March Meeting. Members will be presenting about 100 papers on topics ranging from real-time monitoring of electron spins, to the use of pulsed magnetic fields to study the structural properties of materials.

GIMS

NEWSLETTER

AMERICAN PHYSICAL SOCIETY

Topical Group on Instrument and Measurement Science

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College Park, MD 20740-3844

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