

# Instrument and Measurement Science

FEBRUARY 2013

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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 2013

The 2013 Keithley Award was split between three recipients, as follows:



**David McClelland**  
Australian National University

**Nergis Mavalvala**  
Massachusetts Institute of Technology

**Roman Schnabel**  
Leibniz Universität Hannover

Citation:  
*For seminal contributions to the development and application of quantum metrological methods, in particular of squeezed light sources and optical springs, enabling sensitive measurements beyond the standard quantum limit.*

The Keithley Award will be presented at the March meeting in Baltimore on Monday March 18 at 5:45 pm in the Hilton Baltimore, Key Ballroom 8. GIMS is organizing an invited symposium to honor the prizewinners on Wednesday March 20 (session R46: Room: Hilton Baltimore Holiday Ballroom 5: 2:30-5:30). More information is provided below.

## II. APS/GIMS Fellows for 2012

Every year APS elects several of its distinguished members to Fellowship. Each nomination is evaluated by the Fellowship committee of the appropriate APS division, topical group, or forum. This year GIMS elected the following three scientists to Fellowship:

**Altfeder, Igor**  
Air Force Research Lab  
Citation: *For important developments in Scanning Tunneling Microscopy, in particular for development of thermal Scanning Tunneling Microscopy technique and experimental discovery of field-induced vacuum phonon tunneling.*

**Chang, Chia-Seng**  
Academia Sinica  
Citation: *For long lasting contribution in surface sciences and nanotechnology research, and innovative developments on scanning probe microscopy, UHV TEM-STM combined system for in-situ nanoscale observation and measurements, and the development of phase plate and wet cell for TEM for biological imaging*

**Padmore, Howard**  
Lawrence Berkeley National Laboratory  
Citation: *For seminal contributions to X-ray optics, instrumentation, and research with synchrotron radiation.*

GIMS is asking its members to make nominations to APS Fellowship for 2013. Nominations are due on May 1st. Details on the nomination process can be found at: <http://www.aps.org/programs/honors/fellowships/index.cfm>

## III. GIMS Selection Committees

### APS KEITHLEY AWARD

For awarding at March Meeting 2013: Eric Hudson (chair), J.A. Stroscio; A. Mandelis (2012 Keithley awardee); J. Musfeldt; W. Geerts.

### APS/GIMS FELLOWSHIP

For awarding at March Meeting 2013: Fedor Balakirev (chair), Alain Diebold, Terrence Jach, Barry Zink.

## IV. GIMS Sessions at March Meeting 2013 in Baltimore, MD

GIMS session chairs will be provided with sign-up sheets and asked to encourage session attendees to join GIMS.

### INVITED SYMPOSIA:

GIMS is organizing three symposia at the March Meeting in Baltimore. The Keithley award symposium on Wednesday afternoon (2:30 PM) brings together five experts on enabling sensitive measurements beyond the standard quantum limit. For more details on the 2013 Keithley award see the article elsewhere in this newsletter and the lists with invited speakers provided below. The second symposium is on advances in actinide measurement techniques and takes place on Friday morning (8:00AM). The third symposium is on time- and angle-resolved photoemission spectroscopy of complex materials and takes place on Friday morning (11:15 am).

By bringing together expertise on innovative instrumentation development GIMS hopes to spark interest within the measurement

science community for the development of new instruments suitable to solve some of the materials science issues that we currently face. Details on the sessions and invited speakers of the symposia are provided below.

### Session R46 Invited Session: Keithley Session: Enabling Sensitive Measurements Beyond the Standard Quantum Limit

Wednesday March 20, 2:30 AM  
Hilton Baltimore Holiday Ballroom 5  
Sponsor: GIMS, Chair: *Eric Hudson, The Pennsylvania State University.*

#### 2:30-3:06 PM:

R46.01: Joseph F. Keithley Award For Advances in Measurement Science Lecture: Squeezing: the future for gravitational wave detectors,  
Keithley Award Winner: David McClelland.

#### 3:06-3:42 PM:

R46.02: Joseph F. Keithley Award For Advances in Measurement Science Lecture: Beyond the quantum limit in gravitational wave detection,  
Keithley Award Winner: Nergis Mavalvala

#### 3:42-4:18 PM:

R46.03: Exploring quantum limits with micro-mechanical membranes,  
Invited speaker: Cindy Regal.

#### 4:18-4:54 PM:

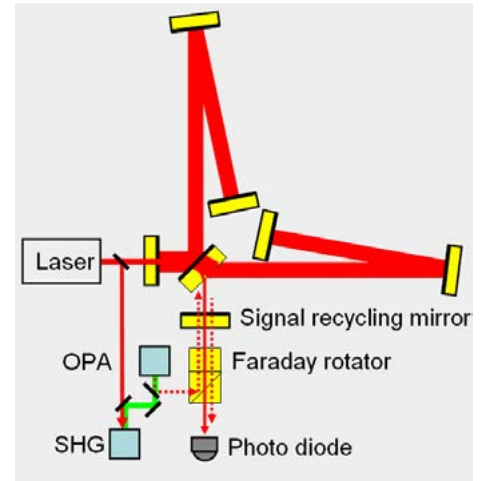
R46.04: Approaching the Quantum Limits of Displacement Detection,  
Invited speaker: John Teufel

#### 4:54-5:30 PM:

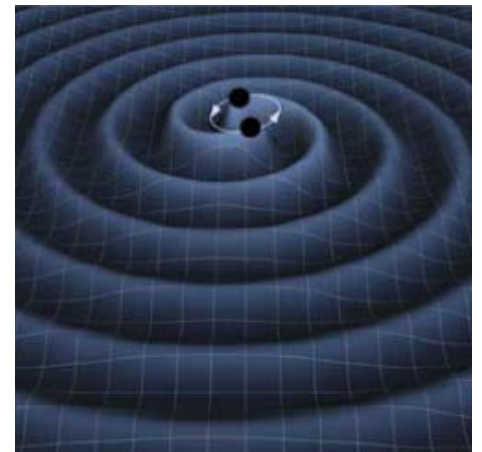
R46.05: Quantum Non-Demolition Measurements between a Graphene Nanomechanical Resonator and a Diamond Nitrogen-Vacancy Center,  
Invited speaker: Brian D'Urso

### Session Y10 Invited Session: Advances in Actinide Measurement Techniques

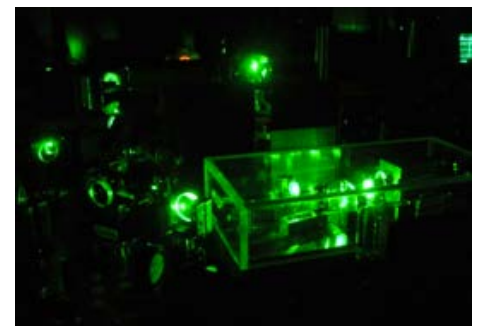
Friday March 22, 8:00 AM, Room 309  
Sponsor: GIMS; Chair: *Franz Freibert, Los Alamos National Laboratory*



Gravitational wave detection



Loss of energy of orbiting neutron stars carried away as gravitational waves.



Squeezed light experiment at the Center for Gravitational Physics (ANU)

**8:00-8:36 AM:**

Y10.01: Anomalous thermodynamic behavior in actinides,  
Invited speaker: Arkady Shekhter

**8:36-9:12 AM:**

Y10.02: Multiconfigurational nature of 5f orbitals in uranium and plutonium and their intermetallic compounds,  
Invited speaker: Corwin Booth

**9:12-9:48 AM:**

Y10.03: Observation of  $^{239}\text{Pu}$  NMR in  $\text{PuO}_2$ —A new frontier for the physics and chemistry of plutonium compounds, Invited speaker: Yasuoka Hiroshi

**9:48-10:24 AM:**

Y10.04: An instrument for the investigation of actinides with spin resolved photoelectron spectroscopy and bremsstrahlung isochromat spectroscopy,  
Invited speaker: James Tobin

**10:24-11:00 AM:**

Y10.05: Transuranic Photoemission Using a Unique Light Source,  
Invited speaker: John Joyce

**Session Z1 Invited Session: Time- and Angle-Resolved Photoemission Spectroscopy of Complex Materials**

Friday March 22, 11:15 am, Ballroom I  
Sponsor: GIMS; Chair: *Thomas Devereaux, SLAC National Acceleratory Laboratory*

**11:15-11:51 AM:**

Z1.01: Ultrafast Optical Excitation of a Persistent Surface-State Population in the Topological Insulator  $\text{Bi}_2\text{Se}_3$ ,  
Invited speaker: Jonathan Sobota

**11:51-12:27 PM:**

Z1.02: Ultrafast momentum-dependent quasiparticle dynamics in high-Tc superconductors  
Invited speaker: Uwe Bovensiepen

**12:27-1:03 PM:**

Z1.03: Measurement of intrinsic Dirac fermion cooling of a topological insulator with time- and angle-resolved photoemission spectroscopy,  
Invited speaker: Yihua Wang

**1:03-1:39 PM**

Z1.04: Time-resolved ARPES and f-electron coherence,  
Invited Speaker: Tomasz Durakiewicz

**1:39-2:15 PM**

Z1.05: Ultrafast quasiparticle dynamics and pair recombination in cuprate high-temperature superconductors,  
Invited Speaker: Chris Jozwiak

**Focus and Contributed Sessions (101 talks):**

GIMS is organizing 7 focus sessions and one contributed session. See below for the room location of each session.

**Session A38 Focus Session: Instrumentation and Measurement Science for a Sustainable Energy Future**

Monday March 18, 8:00 am, Room 347  
Sponsor: GIMS Chair: *Wilhelmus Geerts, Texas State University at San Marcos*, 11 talks.  
Invited Speakers: Raymond L. Orbach, Piotr Zelenay

**Session B39 Focus Session: Imaging & Modifying Materials Under Extreme Conditions of Radiation, Temperature, and at the Limits of Space and Time Resolution**

Monday March 18, 11:15 am, Room 348  
Sponsor: DMP GIMS, 9 talks.  
Invited Speakers: Geoffrey Campbell, Laura Smilowitz

**Session J46 Focus Session: X-ray and Neutron Instruments and Measurement Science**

Tuesday March 19, 2:30 pm, Room: Hilton Baltimore Holiday Ballroom 5  
Sponsor: GIMS Chair: *Albert Migliori, Los Alamos National Laboratory* Room: Hilton Baltimore Holiday Ballroom 5, 14 talks.  
Invited Speakers: Stefano Marchesini

**Session M46: Novel Instrumentation and Measurements for Biomedical Research**

Wednesday March 20, 8:00 am, Room: Hilton Baltimore Holiday Ballroom 5 Sponsor: GIMS Chair: *Larry Nagahara, National Cancer Institute*, 13 talks.  
Invited Speakers: Shyam Khatau.

**Session N46: Detectors, Sensors, and Transducers**

Wednesday March 20, 11:15 am Room: Hilton Baltimore Holiday Ballroom 5 Sponsor: GIMS Chair: Brad Ramshaw, Los Alamos National Laboratory, 14 talks.

**Session T46 Focus Session: Advances in Scanned Probe Microscopy 1: Scanning Probe Spectroscopy & Novel Applications to C-based Systems**

Thursday March 21, 8 am Room: Hilton Baltimore Holiday Ballroom 5  
Sponsor: GIMS Chair: *Alexander Otte, Delft University of Technology*, 13 talks  
Invited Speakers: Jungseok Chae

**Session U46 Focus Session: Advances in Scanned Probe Microscopy 2: High Frequencies and Optical Techniques**

Thursday March 21, 11:15 am, Room: Hilton Baltimore Holiday Ballroom 5  
Sponsor: GIMS Chair: *Robert McMichael, NIST*, 13 talks.  
Invited Speakers: Feng Guo

**Session W46 Focus Session: Advances in Scanned Probe Microscopy III: Novel Approaches and Ultrasensitive Detection**

Thursday March 21, 2:30 pm Room: Hilton Baltimore Holiday Ballroom 5  
Sponsor: GIMS Chair: *Eric Hudson, Pennsylvania State University*, 12 talks.  
Invited Speakers: Andreas Heinrich

## V. GIMS Business Meeting

Tuesday, March 19, 5:45-6:45 Session K46  
GIMS Business Meeting, Sponsor: GIMS Room: Hilton Baltimore Holiday Ballroom 5

## 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, Rachael Floyd, RFloyd@janis.com, should be contacted before the meeting to give advance notice, and all travel receipts should be saved for subsequent submission to the APS for reimbursement.

### 2012 Student Travel Award

The 2012 GIMS Student Travel Award was granted to Aniruddha Dutta from the University of Central Florida for his presentation entitled “*Quantification of metallic nanoparticle morphology with tilt series imaging by transmission electron microscopy*”.

## VII. Next GIMS Election

An election for Vice-chair, and a Member at large is currently underway.

## VIII. Treasurer’s Report

As of 12/31/12

<b>Revenue</b>	
Dues-APS	\$2785.00
March meeting share	\$4177.00
Allocated Investment Income	\$1808.21
Sponsorships	\$350.00
<b>Total Revenue</b>	<b>\$9120.21</b>
<b>Expenses</b>	
Reception at business meeting	\$2713.72
Overnight mail	\$6.67
Travel and Grants	\$2813.39
Sorters meeting	\$1041.85
<b>Total Expenses</b>	<b>\$6575.63</b>
<b>Revenue–Expenses</b>	<b>\$2544.58</b>

## IX. Results of GIMS Election Held March 2012

### For Vice-Chair:

Fedor Balakirev  
(Los Alamos National Laboratory)

### For Member-at-large:

Alain Diebold  
(University at Albany)

Veerle Keppens  
(University of Tennessee, Knoxville)

## X. Current GIMS Governance

**Past Chair:** Eric Hudson (3/12 -3/13),  
*Pennsylvania State University*

**Chair:** Wilhelmus Geerts (3/12–3/13),  
*Texas State University San Marcos*

**Chair-Elect:** Albert Migliori (3/12–3/13),  
*Los Alamos National Laboratory*

**Vice-Chair:** Fedor Balakirev, Los Alamos  
National Laboratory

**Secretary-Treasurer:** Rachael Floyd  
(3/11–3/14), *Janis Research Company*

**Member-at-Large:** Barry Zink (03/11-02/14),  
*University of Denver*

**Member-at-Large:** Janos Kirz (3/11–02/14),  
*Lawrence Berkeley Nat. Lab*

**Member-at-Large:** Terrence Jach (03/11-  
02/14), *NIST*

**Member-at-Large:** Dan Johnstone (03/11-  
02/14), *Semetrol, LLC*

**Member-at-Large:** Alain Diebold (3/12–3/15),  
*University at Albany*

**Member-at-Large:** Veerle Keppens (3/12-  
3/15), *University of Tennessee, Knoxville*

# X1. Unit Convocation Report

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The 2012 Unit Convocation was held in April 2012 and the GIMS group was represented by Wim Geerts and Rachael Floyd. The 2013 Unit Convocation was held in February 2013 and the GIMS group was represented by Fedor Balakirev and Rachael Floyd.

This meeting is an excellent opportunity to meet the leadership of other APS groups and of the APS itself. From the APS website: "The divisions, topical groups, forums, and sections play a vital role in the American Physical Society. Units aid the Society in fulfilling its mission to "advance and diffuse the knowledge of physics." As part of a Society committed to member participation, the units provide opportunities for members to interact with colleagues with similar interests and to keep abreast of new developments in their specialized fields."

The APS has substantial resources available to assist the units with their operations, including design and printing services and IT support. The unit handbook contains more details for those interested.

The APS Office of Public Affairs is a resource for those members wanting information on public policy, and can help those members who would like to be more involved in public affairs. They can assist with writing op-eds, or with information to use when contacting our congressperson, for example. Members attending the unit convocation were invited to spend a day visiting Capitol Hill and were provided with talking points and leave-behind packages to help make the visits worthwhile.

## Strategic plan

The APS unveiled its new strategic plan at the 2012 Unit Convocation. Details of this plan can be found at: <http://www.aps.org/about/strategy>

We encourage everyone to review this strategic plan to see what APS has planned for the society moving forward.

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**GIMS**  
**NEWSLETTER**

AMERICAN PHYSICAL SOCIETY

Topical Group on Instrument and Measurement Science

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