



GEC 2011

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**64th Annual
Gaseous Electronics Conference
15 – 18 November, 2011**

**Salt Palace Convention Center
Salt Lake City, Utah, USA**

2nd Announcement

The Sixty-Fourth Annual Gaseous Electronics Conference, will be held November 15 – 18, 2011 at the Salt Palace Convention Center in Salt Lake City, Utah.

This year's event will be co-located with the Division of Plasma Physics (DPP) Meeting. While each of these meetings will have unique content and meeting venues they will share general session information, poster presentation space, and exhibitor & demonstration space.

The GEC Executive Committee invites the submission of abstracts on the topics of basic phenomena and plasma processes in partially ionized gases, plasmas in liquids, and also the theory and measurement of basic atomic and molecular collisional processes. Papers reporting on experimental, theoretical, and computational studies that address either fundamental properties of low temperature plasmas or their applications are encouraged.

Examples of topics include (but are not limited to):

- Plasma processing of materials including semiconductors, metals, insulators, MEMS devices and displays,
- Biological and emerging applications of plasmas,
- Plasma-surface interactions,
- Plasma diagnostics,
- High pressure and micro-plasmas,
- Plasmas in liquids,
- Gas discharge lamps,
- Gas lasers,
- Plasma chemistry and combustion,
- Plasma aerodynamics,
- Ionospheric phenomena,
- Ion sources,
- Electron and photon collisions with atoms and molecules,
- Heavy particle interactions: ion-molecule, neutrals etc.

The Oral and Poster Session Topic Index is listed on page 4.

All of the invited speakers are listed below and their presentations anchor the world-class program. Finally, the GEC is honored to host the "**Foundation Talk**" lecture by Dr. Richard Gottscho of Lam Research Corporation.

INVITED PRESENTATIONS

The GEC Executive Committee has selected several topics for special emphasis. The invited speakers, their affiliations and tentative titles of their presentations for the 2011 GEC are:

Foundation Talk

R. Gottscho, *Lam Research Corporation (US)*, Plasma Etching – The challenges ahead in enabling nanoelectronics.

Heavy-Particle Collisions

M. Schultz, *Missouri University of Science & Technology (US)*, Manipulating atomic fragmentation processes by controlling the projectile coherence

R. Barrachina, *Centro Atómico Bariloche (Argentina)*, Multiple scattering effects in ionization processes

Electron-Molecule Collisions

T. Field, *Queen's University Belfast (UK)*, Electron attachment to radicals and reactive molecules

A. Dorn, *Max-Planck-Institut für Kernphysik (Germany)*, (e, 2e) experiments on small noble gas clusters: search for multicenter and interference effects

C. Malone, *Jet Propulsion Laboratory (US)*, Low energy electron collision parameters for modeling auroral/day glow phenomena

D. Madison, *Missouri University of Science & Technology (US)*, Accuracy of theoretical calculations for electron-impact ionization of large molecules

M. Khakoo, *California State University (US)*, Low energy near-threshold electron impact electronic excitation of water and furan

M. Bettega, *Universidade Federal do Parana (Brazil)* Electron-molecule collisions

Electron and Positron Scattering

G. García, *Consejo Superior de Investigaciones Científicas (Spain)*, Nanoscale models for energy deposition of photon, electrons and positrons in gases

J. Sullivan, *Australian National University (Australia)*, Absolute measurements of differential cross sections in low energy positron scattering

High-Pressure Plasmas

J-P. Boeuf, *Université Paul Sabatier (France)*, Dynamics and pattern formation during microwave breakdown at atmospheric pressure

Plasma Diagnostics

J. Benedikt, *Ruhr University (Germany)*, Diagnostics of atmospheric pressure microplasma jets by means of molecular beam mass spectrometry.

K. Tachibana, *Ehime University (Japan)*, Spectroscopic diagnostics of high pressure plasmas

J. Hopwood, *Tufts University (US)*, Spatially-resolved diagnostics of 1-GHz microdischarges

Plasma Etching

M. Izawa, *Hitachi High-Technologies Corp (Japan)*, Mechanism of Si and metal etching based on sticking reaction model

S. Samukawa, *Tohoku University (Japan)*, Damage-free neutral beam etching, deposition and surface modification processes for novel nano-scale devices

Electric Propulsion and Combustion

K. Sasaki, *Hokkaido University (Japan)*, Effect of energetic electrons on combustion of premixed burner flame

J. Foster, *University of Michigan (US)*, Mission enabling: The plasma sources of electric propulsion--challenges and prospects for the future

A. Aanesland, *Laboratoire de Physique des Plasmas (LPP) Ecole Polytechnique (France)*, Alternate acceleration of positive and negative ions for space propulsion applications

RF Plasmas

J. Schulze, *Ruhr-University Bochum (Germany)*, Electron heating and the electrical asymmetry effect in capacitive rf discharges

Plasma Modeling

G. Cunge, *Laboratoire des Technologies de la Microélectronique, CNRS (France)*, Analysis of pulsed etching plasmas by new optical and mass spectrometry based diagnostics

I. Kaganovich, *Princeton Plasma Physics Laboratory (US)*, Nonlocal electron kinetics for plasma technologies

D. Economou, *University of Houston (US)*, Control of ion energy distributions on plasma electrodes

Novel Plasma Applications

K. Terashima, *University of Tokyo (Japan)*, Plasmas in High-Density Medium - Cryogenic plasma and supercritical fluid plasma

M. Bowden, *The Open University (UK)*, Microdischarges: novel designs and novel materials

U. Kortshagen, *University of Minnesota (US)*, The physics and applications of nanomaterials produced with nonthermal plasmas

Pulsed Discharges

G. Pemen, *Eindhoven University of Technology (Holland)*, Streamers and their applications

I. Adamovich, *Ohio State University (US)*, Nanosecond pulse discharges and fast ionization wave discharges: fundamental kinetic processes and applications

ORAL AND POSTER SESSION SORTING CATEGORIES

In addition to the topics listed above, the Executive Committee solicits contributed oral and poster presentations on the wide range of topics normally addressed at the GEC. The abstract sorting categories are listed below; but you may always contact the local secretary or an Executive Committee member for assistance if you have difficulty choosing the category which best fits your work.

1 Atomic and Molecular Processes

- 1.1 Electron and photon collisions with atoms and molecules: excitation
- 1.2 Electron and photon collisions with atoms and molecules: ionization
- 1.3 Heavy particle collisions
- 1.4 Dissociation, recombination and attachment
- 1.5 Distribution functions and transport coefficients for electrons and ions
- 1.6 Other atomic and molecular collision phenomena

2 Plasma science

- 2.1 Nonequilibrium kinetics of low-temperature plasmas
- 2.2 Basic plasma physics phenomena in low-temperature plasmas
- 2.3 Plasma boundaries: sheaths, boundary layers, others
- 2.4 Gas phase plasma chemistry
- 2.5 Plasma-surface interactions
- 2.6 Plasma diagnostic techniques
- 2.7 Plasma modeling and simulation
- 2.8 Glows: dc, pulsed, microwave, others
- 2.9 Capacitively coupled plasmas
- 2.10 Inductively coupled plasmas
- 2.11 Magnetically-enhanced plasmas: ECR, helicon, magnetron, others
- 2.12 High pressure discharges: dielectric barrier discharges, coronas, breakdown, sparks

- 2.13 Microdischarges: dc, rf, microwave
- 2.14 Thermal plasmas: arcs, jets, switches, others
- 2.15 Plasmas in liquids
- 2.16 Negative ion and dust particle containing plasmas
- 2.17 Other plasma science topics

3 Plasma applications

- 3.1 Plasmas for light production: laser media, glows, arcs, flat panels and novel sources
- 3.2 Plasma etching
- 3.3 Plasma deposition
- 3.4 Plasma ion implantation
- 3.5 Green plasma technologies: environmental and energy applications
- 3.6 Plasma processing for photovoltaic applications
- 3.7 Biological and biomedical applications of plasmas
- 3.8 Plasma propulsion and aerodynamics
- 3.9 Plasmas for nanotechnologies, flexible electronics and other emerging applications

4 Special arranged sessions

- 4.1 Control of distribution functions in low temperature plasmas workshop
- 4.2 Plasma data exchange project

ABSTRACT SUBMISSION

The deadline for receipt of abstracts is 5:00 pm US Eastern Daylight Time on July 15, 2011.

Contributed papers may be given orally in a 15-minute timeslot (12 minutes for presentation and 3 minutes for questions) or as a poster. For either mode, authors must submit an abstract, which briefly but accurately describes the new scientific work.

Contributors must submit abstracts using the American Physical Society online web submission process at <http://abs.aps.org/>.

To submit an abstract, you will need to have available (1) the GEC sorting category code for the abstract (*see previous page*), (2) the number and ordering of authors and collaborators, and (3) the abstract content. The website will ask you for an American Physical Society membership number; but you can just type "GEC abstract" in the member ID box if you are not an APS member.

The web page will guide you through the submission process. We strongly suggest that you proof-read your *formatted* abstract before submission. This is done by logging onto <http://abs.aps.org/> and selecting the meeting "TEST." When you are ready to submit your abstract, select the GEC2011 meeting button, and a form will be created for you. Simply input your information as requested. If you encounter problems at any point in the abstract submission process, please contact the APS Abstract Help-Line abs-help@aps.org or call (301)209-3290 during regular business hours, US Eastern Daylight Time.

Abstracts can be withdrawn until November 4, 2011

GEC INFORMATION ONLINE

The GEC2011 official website is <http://conferences.wsu.edu/gec>. This website will contain the most detailed and up-to-date information on the conference and its location. Additional information may be obtained from the American Physical Society website at <http://www.aps.org>. The GEC maintains a permanent website at <http://www.gec.org/>.

LOCAL ORGANIZING COMMITTEE

Further information on the conference may be obtained from the conference secretary at the following addresses: (email correspondence is preferred)

Patrick Pedrow (Conference Secretary)

Washington State University
P.O. Box 642752
Pullman, WA 99164-2752
Voice: (509) 335-1749
pedrow@eecs.wsu.edu

Ed Barnat

evbarna@sandia.gov

Larry Overzet

overzet@utdallas.edu

Don Madison

Madison@mst.edu

Yevgeny Raitses

yraitses@ppl.gov

REGISTRATION

Registration fees are listed below and include the Monday evening opening reception, a copy of the combined DPP/GEC Bulletin, coffee breaks and admission to the optional workshops being held all day Monday & Tuesday evening. The banquet to be held on Thursday evening is an additional \$60 fee. Advanced registration closes on October 21, 2011.

	Advanced	On-site
Attendee Registration	\$400	\$450
Retired Registration	\$130	\$140
Unemployed Registration	\$130	\$140
Student Registration	\$80	\$130

Registration can be cancelled with a \$25 cancellation fee until November 11, 2011. After November 11, no cancellations will be accepted.

SPECIAL EVENTS

GEC will present one all day pre-conference workshop on Monday, November 14 and one evening workshop on Tuesday, November 15. Details about each individual workshop are shown below; however procedures listed here apply to both workshops.

Interested participants who would like to deliver talks and posters on these two workshop topics at GEC 2011 should submit an abstract following the rules for abstract submission and use the sorting code "4.1 Control of distribution functions in low temperature plasma workshop" or "4.2 Plasma Data Exchange Project."

These two sorting categories will allow the organizers to identify a pool of participants willing to talk at the workshops. With these two sorting categories, submissions which contribute to the overall objectives of the workshops will be considered for inclusion in an oral or poster session during the GEC conference or in a workshop presentation. Time permitting all attendees submitting an abstract for either workshop category will be offered an opportunity to briefly present ONE PowerPoint slide at the corresponding workshop.

Control of Distribution Functions in Low Temperature Plasmas: Creating the Roadmap

This 2011 GEC pre-conference workshop will be held all day on Monday, November 14 and will address current research in methods of controlling the $f(\mathbf{v}, \mathbf{r}, t)$ of electrons, ions and neutrals, discuss the challenges facing the field and develop a *roadmap* of priorities to achieve the control. There will be no fee to attend the workshop for those who have registered for the GEC or DPP. Lunch will not be provided by the workshop but will be available for purchase nearby.

Questions regarding this workshop should be directed to Igor Kaganovich, ikaganov@pppl.gov

Plasma Data Exchange Workshop

The Plasma Data Exchange Project is an informal, community-wide project which was initiated at the GEC in 2010 as a response to the growing awareness in the low temperature plasma community that some means of collecting, evaluating and sharing data needed for modeling and interpretation of experiments is necessary. Benchmarking of different software tools and modeling techniques are additional issues being addressed in the context of this project. Anyone interested in participating in these activities is welcome to be part of the project.

A workshop to report progress on this project is scheduled for the evening of Tuesday, November 15 and is open to all registered GEC or DPP participants. The focus topics for the 2011 workshop are the intercomparison of data derived from theory, modeling and experiment for electron scattering and electron transport in rare gases and an update on the progress of

LXCat, an open-access website for data related to the electron component of low temperature plasmas. Participants interested in presenting a talk at the workshop or anyone desiring more information about the workshop or the project itself should contact Leanne Pitchford, pitchford@laplace.univ-tlse.fr.

SOCIAL EVENTS

Reception

An opening reception will be held on the evening of Monday November 14, 2011, beginning at approximately 6:00 pm. Pick up your registration packets from 5:00 – 6:00 pm and then stay to enjoy refreshments and socializing at the reception.

Conference Banquet

A conference banquet will be held on Thursday evening, November 17, 2011. This will provide an opportunity for the presentation of prizes and Executive Committee announcements.

ACCOMMODATIONS

The conference will be held at the Salt Palace Convention Center. A block of rooms has been reserved for conference participants at the **Hilton Salt Lake City Center**. Room rates are shown below. The deadline for making reservations at the conference rate is **October 14, 2011**.

Conference Hotel

Hilton Salt Lake City Center
255 South West Temple
Salt Lake City, Utah, United States 84101
Phone: 1-801-328-2000

Visit the GEC website to find information about making reservations online.

The GEC 2011 room rate is \$168/night for single or double occupancy. In addition, a limited number of guest rooms are available at the Federal Government per diem rate. Any guest registering for a room at the Federal Government per diem rate will be required to show a Government ID upon arrival.

TRAVEL

From Salt Lake City International Airport

Private (Automobile or Rental Car)

Follow signs for I-80 Eastbound (City Center)
Take I-80 east.
Take Exit 600 South.
Follow 600 South to West Temple (4 lights)
Turn left onto West Temple.
Hotel is 3 ½ blocks on right.

Airport Shared Ride Service: 1-866-550-7433 or visit **www.valleyshuttle.com**.

We recommend taking an airport shuttle (shared-ride) from Salt Lake City International Airport to the Hotel. These shuttles can be reserved and will cost \$8.00 one-way or \$16.00 roundtrip.

Individual Taxi:

Taxis are available at the airport as well. The cost to reach the Hilton Salt Lake City Center will be ~\$20.

VISA Information

Washington State University as the host for this conference will issue a letter of invitation for those international scientists who need a letter for a visa. Please request the letter from Joy Thompson via an e-mail at joythompson@wsu.edu. Please include your name, organization that you will be representing, mailing address, phone, e-mail, and whether you will need an electronic or mailed copy of the letter of invitation.

All requests for letters of invitation must be approved by the Conference Committee.

EXHIBITORS

Exhibitors are an important part of the GEC. The attendees of the conference come from universities, corporations and national laboratories. As a consequence the conference is a natural venue for displaying high-technology products, services, journals and books etc. Historically, an outstanding array of companies and groups have exhibited at the GEC.

For more information, see the “Exhibitors/Sponsors” page on the GEC website or contact the local organizing committee exhibitors’ coordinator. (Joy Thompson joythompson@wsu.edu).

STUDENT SUPPORT**GEC Student Award for Excellence**

In order to recognize and encourage the important contribution students make to the Gaseous Electronics Conference, the GEC Executive Committee will recognize the best paper presented by a student with the:

“GEC Student Award for Excellence”

Only oral presentations are eligible for the prize. Nominations for the award consist of a copy of the student’s abstract (plain text if submitting by email, please do **NOT** send raw LaTeX files) and a supporting letter from the student’s advisor. (Note: this letter is separate from the letter of application for Student Travel Award.) Advisors may nominate only one student.

Nominations should be sent (preferably via email) by the abstract deadline (July 15, 2011) to the GEC Chair:

GEC Student Award Nominations
Dr. Biswa Ganguly
Air Force Research Laboratory
Wright-Patterson AFB, OH 45433
Biswa.Ganguly@wpafb.af.mil

Based upon the abstracts submitted, the GEC Executive Committee will review the nominations and select **Student Award Finalists**. Members from the GEC Executive Committee will serve as judges. Judges will attend the finalists’ talks and select the award winner. The recipient of the Student Award for Excellence will be presented with an award certificate along with a cash prize.

Student Travel Assistance

The GEC is committed to support student participation and offers monetary assistance to student attendees/presenters only. Advisors may request partial reimbursement of travel expenses for students attending and presenting papers at the GEC. To request support, student advisors should send a letter of application (Note: this letter is separate from the letter of support for the GEC Student Award for Excellence) and a copy of the student's abstract (plain text if submitting by email, please do **NOT** send raw LaTeX files) to:

Dr. Don Madison
Curators' Professor of Physics
Missouri University of Science & Technology
1315 N. Pine Street
Rolla, MO 65409-0640
madison@mst.edu

Applications must be received no later than the abstract deadline (July 15, 2011).

Students receiving travel assistance are expected to attend the entire conference. Requests should be sent via email. Advisors may nominate only one student