Final Report

37th IEEE International Conference on Plasma Science

ICOPS 2010

Norfolk, VA

General Chair: Mounir Laroussi

Treasurer: Shirshak Dhali

Technical Program Committee Chair: Christine Coverdale

FINAL REPORT

The 37th IEEE International Conference on Plasma Science (ICOPS 2010) was held in Norfolk, VA, USA, from June 20 to June 24, 2010 with a mini-course on June 24 and 25. The conference venue was the Marriott Waterside hotel located in the center of downtown Norfolk. Both the conference and the minicourse were great successes. 562 abstracts from 37 countries were accepted. Most of the abstracts came from the USA (327), Germany (30), China (30), Japan (28), South Korea (28), Russian Federation (26), UK (20), France (17), and the remaining from various other countries. The largest number of submissions was in area 5.0 (Industrial, Commercial, and Medical Applications) with a total of 188 abstracts, 98 of which were to the biomedical applications sub-topic. It was the opinion of the ICOPS chair and that of the technical committee that in the future the biomedical applications should be a topic on its own. This gained the agreement of ExCom which unanimously voted for it during their Sunday June 20, 2010 meeting. Also, for the first time, ICOPS had a session (11 abstracts) on THz radiation and applications, organized by Baruch Levush of NRL, and 2 special sessions on the emerging field of Plasma Medicine, organized by M. Laroussi and M. Kong. In total, the technical program had 217 oral presentations and 345 posters. There were 91 accepted abstracts in the Basic Processes in Fully and Partially Ionized Plasmas Technical Area (1.0), 89 accepted abstracts in Microwave Generation and Plasma Interactions (2.0), 37 accepted abstracts in Charged Particle Beams and Sources (3.0), 97 accepted abstracts in High Energy Density Plasmas and Applications (4.0), 188 accepted abstracts in Industrial, Commercial, and Medical Plasma Applications (5.0), 29 accepted abstracts in Plasma Diagnostics (6.0), and 31 accepted abstracts in Pulsed Power and Other Plasma Applications (7.0). All these papers were presented in 4 parallel morning oral sessions (preceded by a plenary session), 4 parallel afternoon oral sessions, and 3 afternoon poster sessions. There were only morning oral sessions on Thursday, with the minicourse kicking off in the afternoon.

The plenary talks for 2010 covered Dusty Plasmas (Prof. Laifa Boufendi, GREMI), Non-Equilibrium Plasma Sources (Prof. Erich Kunhardt, Polytech NY. Talk was sponsored by Springer), and High Energy Density Physics (Dr. Kimberly S. Budil, DOE). Dr. Manfred Thumm (KIT) presented the PSAC Award Plenary talk on the use of Gyrotrons for ITER and fusion reactors.

Students were especially encouraged to attend the conference. 28 students were selected from a pool of 41 applicants to receive travel grants. 22 of these accepted the award. There were various personal reasons for those students who did not accept including US entry visa problems. The travel grant covered the registration fee and 4 hotel nights. An NSF grant helped cover these expenses. Student paper awards were also offered. Several dozens nominations were received. The Technical Area Coordinators downselected 11 applicants. These gave presentations in front of a committee the members of which were: Prof. Ravindra

Joshi, Prof. Edl Schamiloglu, Dr. Don Schiffler, and Dr. Christine Coverdale. Two runners up were given certificates (David French, University of Michigan, paper 3B7; Vladislav Vekselman, Technion, Haifa, paper 7C6). Two winners were given certificates, $250 checks, and book vouchers worth $250 (from Springer-Verlag). The winners were Alexander Gorenstein, Cornell University (undergrad), paper 2P54; Natalie Shainsky, Drexel University, paper 2P125. The student paper awards were sponsored by the European Physical Journal D.

As part of ICOPS 2010, a 1.5-day mini-course on low temperature plasma modeling and simulation was offered on Thursday afternoon June 24th and Friday June 25th. The mini-course was held at the conference venue, the Marriott hotel. The mini-course organizer was Prof. Demetre Economou, University of Huston. Three instructors (in addition to Prof. Economou) participated in the lectures. These were Dr. Vladimir Kolobov (CFDRC), Prof. Lax Raja (UT Austin), and Dr. Yukinori Sakiyama (UC Berkeley). The instructors provided a set of comprehensive lectures on modeling techniques for low temperature plasmas and their applications. 18 people registered for the minicourse, 8 of which were students.

The social program and activities offered by the conference were well-attended and much appreciated by the participants. There was an activity/event scheduled for every full day of the conference. A welcome reception was held on Sunday evening. A reception with dinner was held on the Old Dominion University (ODU) campus on Monday evening. It was sponsored by the president of ODU. A 2 hour boat cruise, with dinner, was organized on Tuesday evening. And finally the banquet/awards dinner was held on Wednesday night. During the banquet an award ceremony was held where Prof. M. Thumm received his PSAC award and the students received their best papers awards. New IEEE NPSS fellows were also recognized. In addition, Prof. Igor Alexeff who helped found ICOPS and chaired it (ICOPS 1) in 1974 was recognized in the opening ceremony of the conference. Dr. Robert J. Barker of AFOSR was recognized during Monday's special session on plasma medicine for his early support to this emerging field.

This year the participation in the exhibit program encountered only very limited success. This may have been in part due to exhibitors (of interest to ICOPS) attending the power modulator conference which was held just about 4 weeks earlier. Only 4 exhibitors participated. These were the Cooke Corporation, Tech-X, Virginia Diodes Inc., and K-Tech Corporation. In the exhibition area there were other booths such the NPSS member recruitment booth, the job placement center, journals exhibits (EPJ D, TPS, etc.), and the internet cafe (sponsored by Numerex).

A special issue of the IEEE Transactions on Plasma Science (TPS) devoted to the plenary and invited papers was organized. It is scheduled to be published in April 2011. The Guest editors of this issue are R. Joshi (Old Dominion University), X. Lu (HuaZhong University), and Y. Sakiyama (UC Berkeley).

ORGANIZING COMMITTEE

Conference Executive Committee
General Chair:
Mounir Laroussi
Old Dominion University

Technical Chair:
Christine Coverdale
Sandia National Laboratories

Treasurer:
Shirshak Dhali
Old Dominion University

Minicourse Organizer:
Demetre Economou
Univ. Houston

Students Awards:
Ravindra Joshi
Old Dominion University

Publications Chair:
Ravindra Joshi
Old Dominion University

Student Travel:
Keith Cartwright
Air Force Research Labs

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Jean-Michel Pouvesle
GREMI, France

Edl Schamiloglu
Univ. New Mexico

IEEE Meeting and Conference Management

Lisa Boyd, CMP, Supervisor
Lukrecija Lelong, CMP, Meeting Planner

Registration Management

TDMG, Meetings Dept.
Owings Mills, MD, 21117 USA

TECHNICAL PROGRAM

Session Area	Organizer	Email	Phone
1. Basic Processes in Fully and Partially Ionized Plasmas	Kurt Becker Polytech NY	kbecker@poly.edu	718-260-3608
1.1 Basic Phenomena	Kurt Becker Polytech NY	kbecker@poly.edu	718-260-3608
1.2 Computational Plasma Physics	John Verboncoeur UC Bekeley	johnv@eecs.berkeley.edu	510-642-3477
1.3 Space Plasmas	Greg Howes Univ. Iowa	Gregory-howes@uiowa.edu	319-335-1221
1.4 Partially Ionized Plasmas	Weidong Zhu St. Peter's College	wzhu@spc.edu	201-761-6343
1.5 Dusty Plasmas	Holger Kersten Univ. Kiel, Germany	kersten@physik.uni-kiel.de	0431-880-3872
2. Microwave Generation and Plasma Interactions	Monica Blank CPII	Monica.blank@cpii.com	650-846-3557
2.1 Intense Beam Microwave Generation	Adrian Cross Strathclyde Univ., UK	a.w.cross@strath.ac.uk	44 141-548-4614
2.2 Fast-Wave Devices	Lawrence Dressman NSWC Crane	Lawrence.dressman@navy.mil	812-854-4804
2.3 Slow-Wave Devices	Adam Balckum CPII	Adam.balkcum@cpii.com	650-846-3448
2.4 Vacuum Microelectronics	Lawrence Ives CCR	rli@calcreek.com	650-312-9575
2.5 Codes and Modeling	Alexander Vlasov NRL	vlasov@ccs.nrl.navy.mil	202-767-0034
2.6 Non-Fusion Microwave Systems	Arne Fliflet NRL	Arne.fliflet@nrl.navy.mil	202-767-2469
2.7 Microwave Plasma Interaction	Tim Bigelow ORNL	bigelowts@ornl.gov	865-576-5959
2.8 THz Sources, Radiation, & Applications	Baruch Levush NRL	Baruch.levush@nrl.navy.mil	202-405-4513
3. Charged Particle Beams and Sources	Robert Commisso NRL	Robert.commisso@nrl.navy.mil	202-404-8984
3.1 Plasma, Ion and Electron Sources	Edward Barnat SNL	evbarna@sandia.gov	505-2849828
3.2 Intense Electron and Ion Beams	Bryan Oliver SNL	bvolive@sandia.gov	505-284-7876

4. High Energy Density Plasmas and Applications	Farhat Beg UCSD	fbeg@ucsd.edu	858-822-1266
4.1 Fusion - Inertial, Magnetic and Alternate Concepts	Kazuo Tanaka GSE/ILE	katanaka@eei.eng.osaka-u.ac.jp	81-66879-7232
4.2 Particle Acceleration with Laser and Beams	Markus Roth Tech Univ. Darmstadt	m.roth@gsi.de	49 (0)6151/165417
4.3 Radiation Physics	John Apruzese NRL	apruzese@ppd.nrl.navy.mil	202-767-2939
4.4 High Energy Density Matter	Pravesh Patel LLNL	pravpatel@llnl.gov	925-423-7450
4.5 Laser Produced Plasmas	Mongshen Wei UCSD	mswei@ucsd.edu	858-534-6997
4.6 Fast Z-Pinches, X-Ray Lasers	Jerry Chittenden Imperial College	j.chittenden@imperial.ac.uk	44-20-7594-7654
5. Industrial, Commercial and Medical Plasma Applications	Michael Kong Loughborough Univ.	m.g.kong@lboro.ac.uk	44-1449-227075
5.1 Nonequilibrium Plasma Applications	Satoshi Hamaguchi Osaka Univ.	hamaguch@ppl.eng.osaka-u.ac.jp	81-6-6879-7913
5.2 High-Pressure and Thermal Plasma Processing	Alexander Fridman Drexel Univ.	Fridman@drexel.edu	215-895-1542
5.3 Plasma Thrusters	Lax Raja UT Austin	lraja@mail.utexas.edu	512-471-4279
5.4 Plasmas for Lighting	Sun-Jin Park Univ. Illinois, Urbana	sjinpark@uiuc.edu	217-333-6686
5.5 Medical, Biological and Environmental Applications	Michael Kong Loughborough Univ.	m.g.kong@lboro.ac.uk	44 1449 227075
6. Plasma Diagnostics	Jean-Michel Pouvesle GREMI	Jean-michel.pouvesle@univ-orleans.fr	33-0-238-41-7123
6.1 Optical and X-ray Diagnostics	Jeff Koch LLNL	Koch1@llnl.gov	925-422-3956
6.2 Microwave and FIR Diagnostics	Xinpei Lu HuaZhong Univ.	luxinpei@hust.edu.cn	86-27-87558104
6.3 Particle Diagnostics	Johan Frenje MIT	jfrenje@psfc.mit.edu	617-452-4941
7. Pulsed Power and Other Plasma Applications	Edl Schamiloglu Univ. New Mexico	edl@ece.unm.edu	505-277-4423
7.1 Insulation and Dielectric Breakdown	Hulya Kirkici Auburn Univ.	kirkih@eng.auburn.edu	334-844-1822
7.2 Switching	Naz Islam Univ. Missouri	islamn@missouri.edu	573-882-7570

7.3 Generators	Joshua Leckbee SNL	jjleckb@sandia.gov	505-284-9951
7.4 Compact Pulsed Power and Applications	Ravindra Joshi ODU	rjoshi@odu.edu	757-683-4827

TECHNICAL SESSIONS GUIDE

Location of Sessions

PL Plenary Sessions – Hampton Rds. IV-V
A Oral Sessions – IV Hampton Rds.
B Oral Sessions – V Hampton Rds.
C Oral Sessions – I-II-III Hampton Rds.
D Oral Sessions – VI-VII-VIII Hampton Rds.
P Poster Sessions – Norfolk I-IV

Schedule of Technical Sessions

Monday AM, June 21

Introductory Remarks

Plenary PL1 – "The Discharge Physics of Atmospheric Pressure Non-Equilibrium Plasma Sources" E. Kunhardt

1A: Special Session on Plasma Medicine I

1B: Fundamentals of Atmospheric Pressure Plasmas

1C: Basic Phenomena

1D: Fusion – Inertial, Magnetic, and Alternate Concepts

Monday PM, June 21

1P: Basic Phenomena, Space Plasmas; Vacuum Microelectronics; Partially Ionized Plasmas; Fast-wave devices; Z-pinches I; Nonequilibrium Plasma Applications I; Plasma Medicine I; Optical and X-ray diagnostics; Microwave and FIR Diagnostics; Particle Diagnostics; Switching; Insulation and Dielectric Breakdown; Compact Pulsed Power and Applications; Generators

2A: Slow-wave Devices and Non-Fusion Microwave Systems

2B: Plasmas for Lighting and Flat Panel Displays

2C: THz Sources

2D: High Energy Density Matter and Radiation Physics

Tuesday AM, June 22

Plenary PL2: "High Energy Density Plasma Physics: A View from DOE", K. Budil

3A: Special Session on Plasma Medicine II

3B: Intense Beam Microwave Generation and Fast-Wave Devices

3C: Computational Plasma Physics

3D: Z-pinches I

Tuesday PM, June 22

2P: Intense Beam Microwave Generation; Slow-wave Devices; Codes and Modeling; Non-Fusion Microwave Systems; Microwave Plasma Interaction; Radiation Physics; High Energy Density Matter; Fusion - Inertial, Magnetic, and Alternate Concepts; Plasmas for Lighting and Flat Panel Displays; Nonequilibrium Plasma Applications II; High Pressure and Thermal Plasmas; Plasma Medicine II

Tuesday PM, June 22 (continued from previous page)

4A: Intense Electron and Ion Beams

4B: Partially Ionized Plasmas

4C: Microwave, FIR, and Particle Diagnostics

4D: Insulation and Dielectric Breakdown / Switching

Wednesday AM, June 23

Plenary PL3: PSAC Award Address: "Progress on Gyrotrons for ITER and Future Thermonuclear Fusion Reactors", M. Thumm

5A: Codes and Modeling

5B: Plasmas for Aerospace Applications and Liquid Plasmas

5C: Medical, Biological, and Environmental Applications III

5D: Z-pinches II

Wednesday PM, June 23

3P: Computational Plasma Physics; Dusty Plasmas; THz Technology; Plasma, Ion, and Electron Sources; Intense Electron and Ion Beams; Particle Acceleration with Lasers and Beams; Laser Produced Plasmas; Z-pinches II; Plasma for Aerospace Applications; Environmental Applications and Plasmas used in Medicine

6A: Microwave Plasma Interaction and Vacuum Microelectronics

6B: High Pressure and Thermal Plasmas

6C: Optical and X-ray Diagnostics

6D: Compact Pulsed Power and Applications and Generators

Thursday AM, June 24

Plenary PL4: "Dusty Plasma and Nanotechnology", L. Boufendi

7A: Dusty Plasmas

7B: Plasma Processing Applications

7C: Plasma, Ion, and Electron Sources

7D: Laser Produced Plasmas & Particle Acceleration with Lasers and Beams

Abstracts Breakdown by Topic

Area 1 **Basic processes..**	**Area 2** **Microwave generation…**	**Area 3** **Charged particles beams…**	**Area 4** **High energy density…**	**Area 5** **Ind., comm. medical appl.**	**Area 6** **Plasma diognostics**	**Area 7** **Pulsed power…**
91 abstracts	**89**	**37**	**97**	**188** **98 in biomedical**	**29**	**31**

Contribution Statistics by Country

Country	ICOPS 2010
United States	56%
Germany	5%
China	5%
Japan	5%
South Korea	5%
Russian Fed.	4%
United Kingdom	3%
France	3%
Others (29)	14%

CONFERENCE SPONSORS AND SUPPORTERS

Old Dominion University

Batten College of Engineering & Technology

Laser and Plasma Engineering Institute

Institute of Electrical and Electronics Engineers

IEEE – Nuclear and Plasma Sciences Society

The European Physical Journal

The National Science Foundation

NumerEx

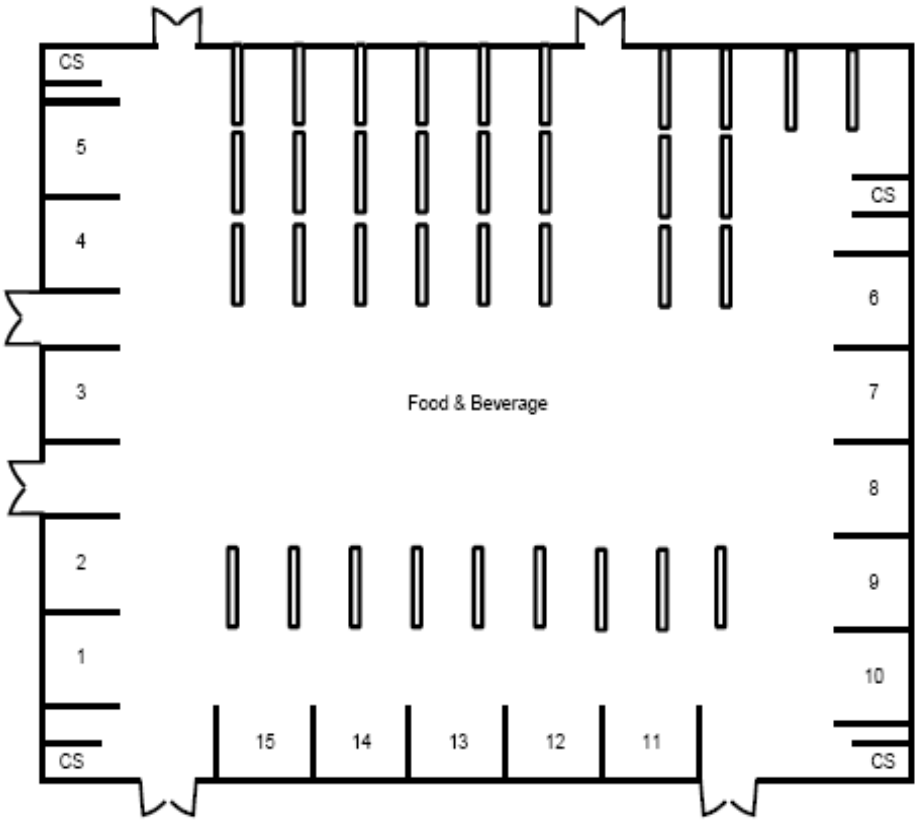
Baxter International Inc.

EXHIBITS TIMELINE

Action/Description	Deadline
Contact Decorator & Get Proposal	9-10 Mnts Out
Contract with Decorator of choice	9-10 Mnts Out
Send Decorator room/property information to create an exhibit floorplan	8 Mths
Finalize exhibitor hours, move in/out dates & times, labor restricitions with site property	8 Mths
Have decorator create exhibitors kit	8 Mths
Approve Exhibitors kit & floorplan	7-8 Mths Out
Work with decorator on preliminary arrangements such as show colors for pipe & drape, entrance units, aisle signs & special area set-ups (registration counters, internet cafes, lounge)	7-8 Mths Out
Create Booth Contract	7-8 Mths Out
Send out soliciation packets to potential exhibitors with conference details, booth contract, exhibit floorplan, exhibitor kit & Registration Forms	6 Mths Out
Post exhibit booth floorplan & information on conference website	6 Mths Out
Receive bids & contract with chosen air frieght carriers, security etc.	6 Mths Out
2nd Notice-Send out soliciation packets to potential exhibitors with conference details, booth contract, exhibit floorplan, exhibitor kit & Registration Forms	4 Mths Out
Supply decorator with exhibitor list and contact information	3 Mths Out & On-going
3rd Notice-Send out soliciation packets to potential exhibitors with conference details, booth contract, exhibit floorplan, exhibitor kit & Registration Forms	2 Mths Out
Process Booth Contracts & payments	On-Going
Add exhibitor to sales spreadsheet & ICM	On-Going
Send booth registration recipt	On-Going
Post exhibitors list on website with booth assisignments	1-2 Mths Out
Create PO's for vendor payments (if applicable)	1-2 Mths Out
Collect Exhibitor Profiles & create spreadsheet	1-2 Mths Out
Finalize any signage for exhibit hall & booths with decorator	1 Month Out
Create an exhibit hall map with booth assisgnments & company names listed	1 Month Out
Exhibit show oversee on-site	On-site

EXHIBITS AND POSTER LAYOUT

The exhibits were held in the Norfolk Ballroom I-IV where the poster sessions and internet café were also located. All morning and afternoon breaks from Monday 21 through Wednesday 23 were hosted in this area, providing great exposure to participants.



15 - 8x10 booths
4 - 6x4 computer stations
35 - 4'x8' poster boards

Exhibit Levels

please pay close attention to deadlines for inclusion in conference materials

BRONZE (BASIC BOOTH) **$2,800** ($3,100 after March 1, 2010)

- ➔ Draped booth space for duration of conference (Monday-Wednesday).
- ➔ Inclusion on the exhibitor list in the printed conference booklet and the electronic (pdf) book of abstracts on conference USB drive as bronze sponsor *).
- ➔ Listed on the exhibition page of the conference website from date of signed contract. Listed as exhibitor during background presentation at the conference banquet.
- ➔ One complimentary registration to the conference. Additional exhibitors must register if they wish to attend technical sessions.

SILVER (STANDARD BOOTH) **$4,500** ($5,000 after March 1, 2010)

- ➔ Draped booth space for duration of conference (Monday-Wednesday).
- ➔ Inclusion with company logo on the exhibitor list in the printed conference booklet and the electronic (pdf) book of abstracts on conference USB drive as silver sponsor *).
- ➔ Linked website banner ad on the exhibition page of the conference website from date of signed contract. Listed as exhibitor during background presentation at the conference banquet.
- ➔ Two complimentary half price registrations (or one complimentary full registration) to the conference. Additional exhibitors must register if they wish to attend technical sessions.
- ➔ Free high speed internet access for one computer at the booth.

GOLD (TWO STANDARD BOOTHS) **$7,200** ($8,000 after March 1, 2010)

- ➔ Double-sized draped booth space (2 standard booths) for duration of conference (Monday-Wednesday).
- ➔ Inclusion with company logo on the exhibitor list in the printed conference booklet and the electronic (pdf) book of abstracts on conference USB drive as gold sponsor *).
- ➔ Linked website banner ad with priority placement on the exhibition page of the conference website from date of signed contract.
- ➔ Listed on separate slide as exhibitor during background presentation at the conference banquet.
- ➔ Two complimentary registrations to the conference. Additional exhibitors must register if they wish to attend technical sessions.
- ➔ Inclusion of an exhibitor provided brochure (pdf-format) on the conference USB drive.
- ➔ Free high speed internet access for one computer at the booth.
- ➔ Two complimentary banquet tickets.

EXHIBITORS

Cooke Corporation

Ktech Corporation

Texas-X Corporation

Virginia Diodes Inc.

European Physical Journal D

IEEE-Nuclear and Plasma Sciences Society

REGISTRATION

Registration Desk

The conference materials were distributed at the Registration Desk located at the foyer of the Hampton Roads rooms on the third floor. The Registration Desk opening hours were:

Sunday	15:00 to 19:00
Monday	6:00 to 17:00
Tuesday	6:00 to 17:00
Wednesday	7:00 to 17:00
Thursday	7:00 to 14:00

Registrants Summary

Registration Counts	Attendees
IEEE Members	173
Student travel grant recipients	25
non-IEEE Members	149
Non-Member Students	104
Student member/Retired/Unemployed	41
Life Fellows	4
Exhibitors	7

SOCIAL EVENTS

Welcome Reception

A welcome reception was held at the Marriott hotel on Sunday June 20 from 5 to 9 pm. There was no charge for conference registrants and companions.

Reception at Old Dominion University

On Monday evening June 21 there was a reception hosted by the President of Old Dominion University (ODU). There was no charge for conference registrants and their companions.

The reception took place at the open air Kaufman Mall of Old Dominion University. Buses shuttled attendees from the hotel to the ODU campus and back.

Boat Cruise aboard the Spirit of Norfolk

A cruise was scheduled on Tuesday evening June 22 on board of the Spirit of Norfolk. Boarding time was at 6:30 PM. Dinner, soft drinks, fruit juices, and water were served. A no-host cash bar

for alcoholic drinks was also available. The cost of the cruise was $20 for conference registrants.

Banquet
The conference banquet was held Wednesday (June 23) evening, in the Marriott Ballroom on the fourth floor of the conference hotel. A nominal payment of $40 was charged for conference registrants and companions.

PUBLICATIONS

The Conference Record was on a USB memory stick. Manuscripts of plenary and invited oral presentations could be submitted for a special issue of the IEEE Transactions on Plasma Science to be published in early 2011. The Guest Editors of this special issue are Prof. Ravindra Joshi, Old Dominion University, Prof. Xinpei Lu, HuaZhong University, and Prof. Yukinori Sakyama, UC Berkeley.

OTHER

The conference offered a Placement Center, free introductory memberships, student travel assistance (sponsored by NSF), and student best papers awards (Sponsored by the European Physical Journal D).

MINICOURSE

Low Temperature Plasma Modeling & Simulation and Applications

As part of ICOPS 2010, a 1.5-day minicourse on low temperature plasma modeling and simulation was offered on Thursday afternoon June 24th and Friday June 25th. The minicourse was held at the Marriott hotel. A group of international experts from academia and industry provided a set of comprehensive lectures on modeling techniques for low temperature plasmas and their applications.
Plasma modeling and simulation are powerful tools to address fundamental questions of plasma physics and chemistry and to interpret experiments. This short course is designed to introduce students, researchers, and engineers to the concepts and methods used in plasma modeling and simulation.
Low temperature plasmas can be modeled from a variety of perspectives, including analytical models, fluid models, Boltzmann models and particle simulations such as Particle-in-Cell/Monte Carlo models. So-called 'hybrid' models combine various aspects of these models; for example a kinetic description of electrons using Monte Carlo methods, with fluid models of heavy species.

Interactions of plasmas with surfaces can be treated with Monte Carlo-based binary collision models or molecular dynamics (MD). MD methods are further classified in terms of the interatomic potentials used, from classical to ab-initio.
Chemically reactive plasmas are generally treated with extensions of approaches taken for other reaction flow problems, including combustion, atmospheric chemistry and chemical vapor deposition. These equations are coupled to the plasma dynamics models and to the appropriate sub-set of Maxwell's equations for electromagnetic effects.
Minicourse Topics Included:

- Plasma Reactors
- Plasma Surface Interactions
- Deterministic Methods for Solving Kinetics Equations
- Multi-dimentional Simulations of Industrial Plasmas
- Capacitively Coupled Discharges
- High Pressure Discharges and Microdischarges
- Fluid Modeling of Atmospheric Pressure Plasmas
- Plasma Chemistry in Atmospheric Pressure Plasmas

Minicourse Organizer:
Prof. Demetre Economou
Department of Chemical and Biomolecular Engineering
University of Houston
Email: Economou@uh.edu

Co-Instructors: Dr. Vladimir Kolobov (CFDRC), Prof. Lax Raja (UT Austin), and Dr. Yukinori Sakiyama (UC Berkeley)

BALANCE SHEET: PRELIMINARY SUMMARY

Note: The complete financial activities will be submitted separately to IEEE by the Treasurer

Expenses		Revenues	
Registration expenses	15030.8	**registration**	229040
Gifts for participants	9478.1	**mini course**	7300
Proceedings/Flash	8404.2	**banquet/cruise**	12200
printing/fliers	5432	**exhibits**	15400
ODU reception	5088.06	**corporate sponsors**	3427.9
cruise	11639.82	**Agencies (NSF)**	10000
student wages	6100	**Abstract (IEEE)**	13850
student award	500	**Interest**	401.16
minicourse	2000	**IEEE Loan**	20000
administration (local)	2023.5		
exhibits/poster boards	4025.86		
Credit Card Fees	8183.55		
Local expenses	2313.67		
IEEE Managemant	5445.46		
AV	15000		
Student Travel Grants (Lodging)	12137.21		
Marriott (excom/staff breakfast, plasma meeting AM/PM break, Lunch Hotel Av, Reception, banquet, security, electricity	92905.88		
Excom Dinner/Norfolk	3954.93		
Excom/Chicago	8491		
Expenses:	**218154**	**Revenues:**	**311619.1**

Balance Sheet	
Revenues	311619.1
Expenses	-218154
Loan Return	-20000
IEEE Management Audit etc	-5000
Anticipated Surplus	**68465.1**