

NSF / DOE

Partnership in Basic Plasma Science and
Engineering

Physics in
Laboratory,
Astrophysics,
Space, and
Manufacturing

*Celebrating
20 years of
Discovery and
Innovation*

20th Anniversary Workshop

National Science Foundation

Stafford I, Rm 375

January 9th – 11th, 2017

Background image: Gekelman et al., PPCF 56 (2014)

Scientific Organizers:

Ellen Zweibel (University of Wisconsin - Madison), Chair

Jorge Rocca (Colorado State University)

Edward Thomas, Jr. (Auburn University)

Logistics

Important Guidelines for the Presenters

Because of the broad nature of the Partnership and the Workshop audience, all presenters are asked to abide by a few general guidelines:

- 1) Presentations should be made to appeal to a diverse audience of scientists.
- 2) Presentations should highlight the impact of the Partnership in enabling the presented work.
- 3) Presentations **must not** discuss any work that is a part of a pending proposal to NSF or DOE.

Speakers: All talks and panel discussions are being webcast live. You are asked to deliver your presentation via email, download, or thumb drive to the A/V support staff ahead of time to enable the live webcast from a master server.

Travel alert: The DC Metro system is undergoing a significant construction that may cause delays. Workshop participants that plan to use Metro should check the website: <http://www.wmata.com/> in order to minimize possible travel disruptions.

Important Information for Entering the NSF Headquarters

The NSF is located in the Stafford I office building with the main entrance at the corner of 9th and Stuart Street in Arlington, VA.

Security: Visitors are asked to **check in 20-30 minutes ahead of time** at the Visitor and Reception Center on the first floor to receive a visitor pass. Each participant will need to present a photo ID to the security guards in order to enter the NSF.

If the Visitor and Reception Center does not have your visitor pass, please have them contact Darren Kimble at x7159 in the NSF Division of Physics.

IMPORTANT ALERT: Currently, Federal Agencies do not accept a Driver's License as a form of ID in the following states: Minnesota, Missouri and Washington. Alternate identification, such as a passport, will be required for attendees from those states.

Room Location: Stafford I, Room 375

Unexpected Travel or Other Delays

If your travel is delayed or there are other circumstances that prevent you from being present to deliver your scheduled talk or poster at the Workshop, please contact the Chair of the Scientific Organizing Committee, Ellen Zweibel <zweibel@astro.wisc.edu> and the NSF POC Vyacheslav Lukin <vlukin@nsf.gov>.

Day 1 [January 9th, 2017]

Chair: Ellen Zweibel (U. Wisconsin – Madison)

- 8:30 (AM) Welcome: Fleming Crim (NSF) & Jim Van Dam (DOE)
- 8:45 Denise Caldwell (NSF): History of the Partnership, Introductory talk
- 9:15 Ronald McKnight (DOE, retired): “Some Thoughts About the Early Days of the Plasma Partnership”
- 9:30 Cliff Surko (UCSD): “With an Eye Toward the Partnership: The 1995 NRC Plasma Science Report”
- 9:45 Timothy Eastman (Wyle - NASA Goddard): “Plasma Science at NSF Prior to the Partnership”
- 10:00 **Coffee Break**

Chair: Vyacheslav Lukin (NSF)

- 10:30 Nat Fisch (Princeton U.): “Some Opportunities in Rotating Plasma”
- 11:00 Cary Forest (U. Wisconsin – Madison): “Energy Conversion Between Forms in the Big Red Ball”
- 11:30 John Goree (U. Iowa): “The breadth of plasma physics topics explored in dusty plasma experiments”
- 12:00 Joel Fajans (UC Berkeley): “Plasma Physics and Antihydrogen”
- 12:30 **Working Lunch at NSF:** Presentations from NSF Partnership Programs
- 1:00pm* JoAnn Lighty (NSF), ENG/CBET Division Director
- 1:20pm* Ilia Roussev (NSF), GEO/AGS Program Director

Chair: Ed Thomas (Auburn U.)

- 1:45 Warren Mori (UCLA): “Full-scale 3D particle-in-cell numerical experiments of high-intensity particle and laser beam-plasma interactions: Past and Future impact”
- 2:15 Li-Jen Chen (U. Maryland – College Park): “From solitary waves in LAPD to the center of magnetic reconnection”
- 2:45 Michael Brown (Swarthmore C.): “Challenges and opportunities of conducting research at undergraduate-only institutions”
- 3:15 **Coffee Break**
- 3:30 Mark Kushner (U. Michigan – Ann Arbor): “Contributions of Basic Plasma Physics to Technology Development Enabled by Modeling”
- 4:00 Burkhard Militzer (UC Berkeley): “Path integral Monte Carlo simulations of dense plasmas”
- 4:30 Vyacheslav Lukin (NSF) & Sean Finnegan (DOE): Introduction to Panel on the Impact of the Partnership in Supporting Advances in Plasma Science & Engineering
- 4:40 Panel Discussion [moderated by Vyacheslav Lukin & Sean Finnegan]
- 5:40 **Adjourn**

Day 2 [January 10th, 2017]

Chair Ilia Roussev (NSF)

- 8:00 (AM) Nuno Loureiro (MIT): “Uncovering new regimes in plasmoid-dominated magnetic reconnection”
- 8:30 Maxim Lyutikov (Purdue U.): “Explosive reconnection and particle acceleration in relativistic plasmas”
- 9:00 Marco Velli (UCLA): “Triggering Fast Reconnection in the Heliospheric Plasma”
- 9:30 Daniel Savin (Columbia U.): “Experimental Investigations of Alfvén Wave Damping Processes Relevant to the Solar Corona”
- 10:00 **Coffee Break**

Chair: Jorge Rocca (Colorado State U.)

- 10:15 Chandrashekhar Joshi (UCLA): “Risky Behavior At the Frontiers of Plasma Science”
- 10:45 Margaret Murnane (U. Colorado - Boulder): “Extreme Nonlinear Optics in Plasmas: Quantum Control with sub-Å and sub-Attosecond Precision”
- 11:15 Selma Mededovich (Clarkson U.): “Chemical and transport processes at a plasma-liquid interface”
- 11:45 Michael Keidar (George Washington U.): “Cold atmospheric plasma physics and application in cancer therapy”
- 12:15 **Lunch on your own**

Chair: Ellen Zweibel (U. Wisconsin – Madison)

- 1:45 Troy Carter (UCLA): “The Basic Plasma Science Facility: Research at the frontiers of fundamental plasma science, enabled by the Partnership”
- 2:15 James Drake (U. Maryland – College Park): “Particle acceleration during magnetic reconnection”
- 2:45 Wayne Scales (Virginia Tech): “Some recent advances in studying space plasmas with high power high frequency HF radiowave heating”
- 3:15 **Coffee Break**
- 3:30 Poster Session [NSF, Stafford I Atrium]
- 6:00 **Adjourn**
- 6:30 **Workshop Dinner** [to be paid for individually]: <http://www.rus-uzcuisine.com/>

Day 3 [January 11th, 2017]

Chair: Jorge Rocca (Colorado State U.)

- 8:15 (AM) Farhat Beg (UCSD): “Physics of high intensity laser matter interactions and energetic particle acceleration”
- 8:45 Howard Milchberg (U. Maryland – College Park): “Spatio-temporal optical vortices”
- 9:15 Julia Mikhailova (Princeton U.): “Waveform-controlled high-order harmonic emission from plasmas”
- 9:45 **Coffee Break**

Chair: Sean Finnegan (DOE)

- 10:00 Amy Wendt (U. Wisconsin – Madison): “Optical Emissions from low-temperature plasmas: using relative spectral intensities to determine plasma properties”
- 10:30 Michael Mauel (Columbia U.): “Advancements of Basic Plasma Physics enabling Progress in Magnetic Fusion Energy”
- 11:00 Riccardo Betti (U. Rochester): “The interplay of fundamental science and inertial fusion”
- 11:30 **Break**
- 11:40 Panel Discussion: The Present and Future Role of the NSF/DOE Plasma Partnership in Stewarding Plasma Science
Chaired by
Ellen Zweibel (U. Wisconsin - Madison)
with panelists
Lorin Matthews (Baylor U.)
Stewart Prager (Princeton U.)
Jorge Rocca (Colorado State U.)
Earl Scime (West Virginia U.)
Edward Thomas, Jr. (Auburn U.)
Gary Zank (U. Alabama - Huntsville)

Discussion Questions:

Q1: *What is the present situation and near-term outlook for US university faculty positions in plasma physics and related disciplines? How could the NSF/DOE Plasma Partnership facilitate an increase in the academic footprint in the disciplines with limited university presence?*

Q2: *What is the place and role of the NSF/DOE Plasma Partnership among the multiple government agencies and programs that support basic and applied research in plasma science?*

- 12:50 Wrap-up
- 1:00 **Adjourn**

Poster Session [NSF Stafford I, Atrium], 3:30pm – 6pm, January 10th.

Sub-session 1: 3:30pm – 4:45pm – all odd-numbered posters

Sub-session 2: 4:45pm – 6:00pm – all even-numbered posters

#	First Name	Last Name	Poster Title
1	Paul	Bellan	Resolving interaction between MHD and non-MHD phenomena in a lab experiment
2	Alain	Brizard	Lifting of the Vlasov-Maxwell Bracket by Lie-transform Method: Theory for Theory's Sake
3	C. Fred	Driscoll	Long-Range Collisions and Transport: a 20 Year Review
4	Charles	Durfee	Control of electron dynamics with tilted ultrafast laser pulses
5	Fatima	Ebrahimi	Three-dimensional plasmoid reconnection - Application to fusion and astrophysical plasmas
6	Jan	Egedal	Dynamics of the Electron Diffusion Region in the Terrestrial Reconnection Experiment (Trex)
7	John	Foster	Plasma physics in liquid water with application to water purification
8	Pierre	Gourdain	Exploring the properties of warm dense matter in the cores of Mega-Earths using pulsed-power generators
9	Nathaniel	Hicks	Initial Study of Plasma Response to a Variable Electric Multipole Configuration
10	Yi-Min	Huang	Plasmoid instability and onset of fast reconnection
11	Hantao	Ji	FLARE: A New User Facility to Study Multiple-Scale Physics of Magnetic Reconnection Through in-situ Measurements
12	Michael	Murillo	Molecular dynamics investigations of non-equilibrium, heterogeneous charged systems
13	Nicholas	Murphy	PlasmaPy: beginning a community developed Python package for plasma physics
14	Chung-Sang	Ng	Surface Currents during a Major Disruption
15	Nikolai	Pogorelov	Modeling Flows of Partially Ionized Plasma with the Multi-Scale Fluid-Kinetic Simulation Suite
16	Jorge	Rocca	Ultra High Energy Density Plasmas
17	Greg	Severn	Are the things you read in theory papers that have not been experimentally validated true?
18	Mikhail	Sitnov	Magnetic reconnection, buoyancy and flapping motions in the magnetospheric tail

#	First Name	Last Name	Poster Title
19	Frederick	Skiff	Studies of the kinetic degrees of freedom of plasma waves
20	Matthew	Stoneking	Electron Plasma in a Purely Toroidal Magnetic Field
21	Cliff	Surko	Strong-Drive Regime of Rotating-Wall Compression - a Workhorse for Physics with Antimatter
22	Edward	Thomas, Jr.	Laboratory studies of dusty plasmas in unmagnetized and magnetized plasmas
23	Petros	Tzeferacos	Numerical modeling of laser-driven experiments that aim to demonstrate magnetic field amplification via turbulent dynamo
24	Joseph	Wang	3-D Particle-in-Cell Simulations of Electron and Ion Dissipation by Whistler Turbulence
25	Jeremiah	Williams	Measurement of the thermal and transport properties in weakly-coupled dusty plasmas
26	Peter	Yoon	Fundamental Kinetic Plasma Processes
27	Gary	Zank	Theory and Transport of Nearly Incompressible Magnetohydrodynamic Turbulence
28	Ellen	Zweibel	Cosmic Rays at Work

Registered Participants (as of Jan 3rd, 2017)

<u>First Name</u>	<u>Last Name</u>	<u>Institution</u>
Snezhana	Abarzhi	Carnegie Mellon University
Kramer	Akli	DOE
Spiro	Antiochos	NASA Goddard Space Flight Center
Thomas	Antonsen	University of Maryland
Michael	Bakas	Bennett Aerospace
Kurt	Becker	NYU
Farhat	Beg	University of California San Diego
Paul	Bellaire	NSF (Retired)
Paul	Bellan	Caltech
Riccardo	Betti	University of Rochester-LLE
Carrie	Black	NSF/AGS
Alain	Brizard	Saint Michael's College
Michael	Brown	Swarthmore College
Troy	Carter	UCLA
Li-Jen	Chen	University of Maryland at College Park
Jean	Cottam	NSF
Vladimir	Demidov	West Virginia University
Danil	Dobrynin	Drexel University
Bill	Dorland	University of Maryland
James	Drake	University of Maryland
C. Fred	Driscoll	University of California at San Diego
Charles	Durfee	Colorado School of Mines
Timothy	Eastman	Wyle - NASA Goddard Space Flight Center
Fatima	Ebrahimi	Princeton University / PPPL
Jan	Egedal	UW-Madison
Joel	Fajans	U.C. Berkeley
Sean	Finnegan	Department of Energy
Nat	Fisch	Princeton University
Cary	Forest	University of Wisconsin Madison
John	Foster	University of Michigan

NSF/DOE Partnership in Basic Plasma Science and Engineering

John	Gillaspy	NSF
Steven	Gitomer	Los Alamos National Laboratory (retired)
Lawrence	Goldberg	National Science Foundation
John	Goree	The Univ. of Iowa
Pierre	Gourdain	University of Rochester
David	Hammer	Cornell University
James	Hawreliak	Washington State University
Nathaniel	Hicks	University of Alaska Anchorage
Yi-Min	Huang	Princeton University
Truell	Hyde	Baylor University
Hantao	Ji	Princeton University
Chandrashekhar	Joshi	UCLA
Michael	Keidar	The George Washington University
James	Klimchuk	NASA Goddard Space Flight Center
Mark	Koepke	West Virginia University
Mark	Kushner	University of Michigan
Martin	Laming	Naval Research Laboratory
David	Lang	National Academy of Sciences
Yue Ying	Lau	University of Michigan
Wim	Leemans	Lawrence Berkeley National Laboratory
L.K.	Len	U.S. Department of Energy
Edison	Liang	Rice University
Nuno	Loureiro	MIT
John	Luginsland	AFOSR
Vyacheslav	Lukin	NSF
Maxim	Lyutikov	Purdue University
Jason	Marshall	AFOSR
Lorin	Matthews	Baylor University
Mike	Mauel	Columbia University
Ronald	McKnight	self
Selma	Mededovic	Clarkson University
Tom	Mehlhorn	Naval Research Laboratory

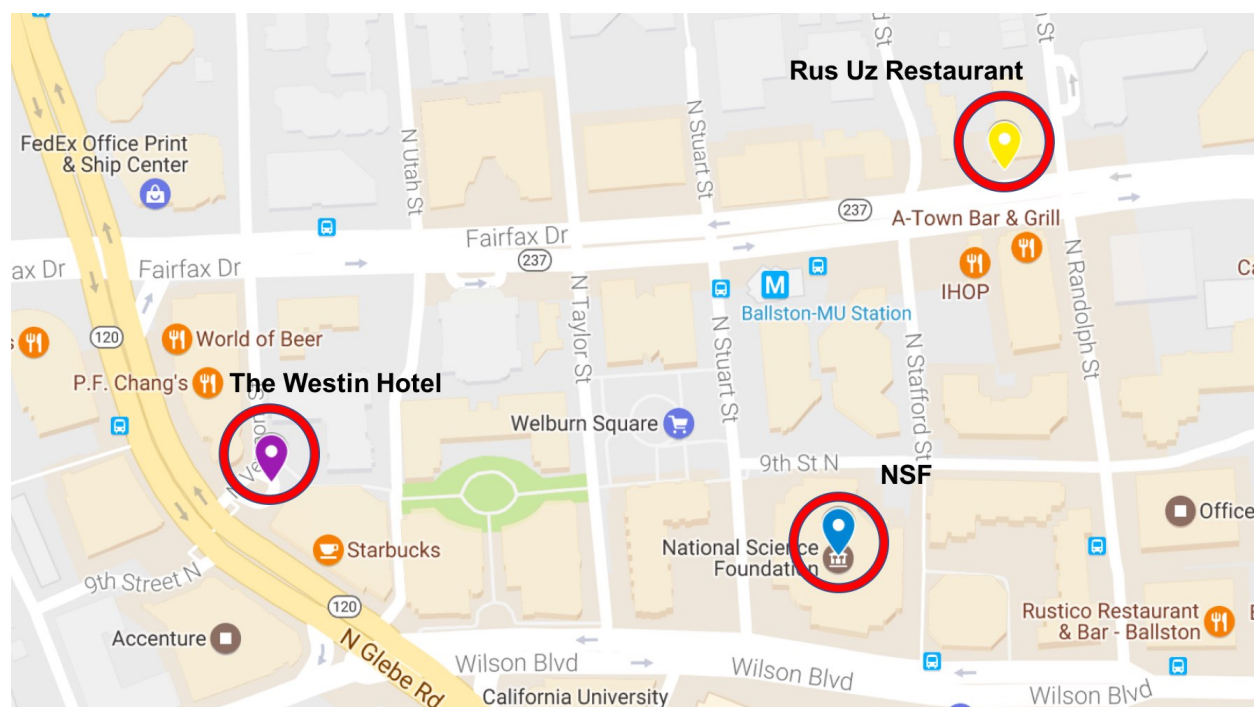
NSF/DOE Partnership in Basic Plasma Science and Engineering

Bogdan	Mihaila	NSF
Yulia	Mikhaylova	Princeton University
Howard	Milchberg	University of Maryland
Burkhard	Militzer	University of California, Berkeley
Warren	Mori	UCLA
Michael	Murillo	Michigan State University
Margaret	Murnane	JILA/University of Colorado at Boulder
Nicholas	Murphy	Smithsonian Astrophysical Observatory
Chung-Sang	Ng	University of Alaska Fairbanks
Nirmol	Podder	Department of Energy
Nikolai	Pogorelov	University of Alabama in Huntsville
Stewart	Prager	Princeton University
Chuang	Ren	University of Rochester
Jorge	Rocca	Colorado State University
Ann	Satsangi	DOE
Daniel Wolf	Savin	Columbia University
Wayne	Scales	Virginia Tech
Barry	Schneider	NIST
Earl	Scime	West Virginia University
Greg	Severn	University of San Deigo
Uri	Shumlak	University of Washington
Mikhail	Sitnov	JHU/APL
Fred	Skiff	University of Iowa
Matthew	Stoneking	Lawrence University
Clifford M.	Surko	University of California, San Diego
Edward	Thomas	Auburn University
Petros	Tzeferacos	University of Chicago
Ryan	Umstattd	ARPA-E
James	Van Dam	U.S. Department of Energy
Marco	Velli	UCLA
Joseph	Wang	University of Southern California
Amy	Wendt	University of Wisconsin - Madison

NSF/DOE Partnership in Basic Plasma Science and Engineering

Jeremiah	Williams	Wittenberg University
Peter	Yoon	University of Maryland
Gary	Zank	University of Alabama in Huntsville
Ellen	Zweibel	U. Wisconsin-Madison

Workshop Dinner Restaurant Information



The workshop dinner will be held at the Rus Uz Restaurant:

<http://www.rus-uzcuisine.com/>

located at 1000 N. Randolph Street, Arlington, Virginia 22202; tel: 571-312-4086
(Entrance on Fairfax Dr. side of the building)