

## **Nuclear Physics SBIR/STTR Program :**

SBIR/STTR Exchange Meeting  
September 13-14, 2010  
Gaithersburg, MD

**M. Farkhondeh**

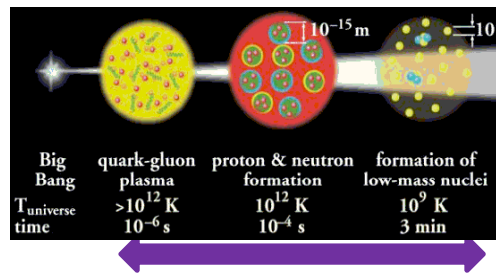
Program Manager  
Advanced Technology Research and Development  
DOE Office of Science  
Office of Nuclear Physics

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  - Accelerator Technology
  - Instrumentation, Detection Systems and Techniques
  - Isotope Science and Technology
- Examples of Current Phase II Grants related to NP challenges
- A note on Final Reports

## Mission Statement Office of Nuclear Physics

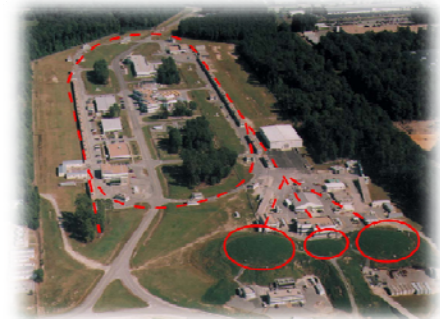
The mission of the Nuclear Physics (NP) program is to discover, explore, and understand all forms of nuclear matter. The fundamental particles that compose nuclear matter - quarks and gluons - are relatively well understood, but exactly how they fit together and interact to create different types of matter in the universe is still not fully explained. To solve this mystery, NP supports experimental and theoretical research - along with the development and operation of particle accelerators and advanced technologies - to create, detect, and describe the different forms and complexities of nuclear matter that can exist in the universe, including those that are no longer found naturally.



Nuclear Physics



RHIC collider at BNL.



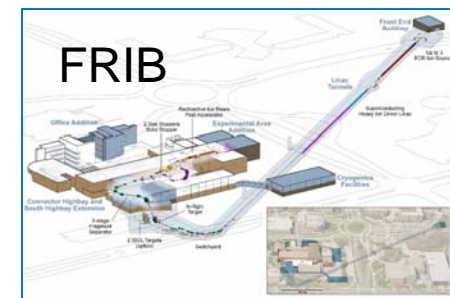
TJNAF



ATLAS at ANL



HRIBF at ORNL



## SBIR/STTR Exchange Meeting

- The DOE Office of Nuclear Physics (NP) is seeking to assess effectively the performance of NP supported SBIR/STTR projects in contributing to the NP mission and goals. The meeting today is designed to serve that purpose and to achieve the following goals:
  - To provide a platform for small businesses to present the status of NP-supported Phase II grant work to the NP community and Federal Program Managers.
  - To offer an opportunity to exchange information regarding the companies' capabilities and the technical needs of the NP programs.
  - To strengthen the ties of the SBIR/STTR businesses with the community and enhance the possibilities for commercialization.
  
- For this year's meeting, all Phase II awardees in year -2 (awarded in FY08) and awardees still active under "no cost extension" were invited. A total of 24 SBIR presentations will be given in 2 days. FY 2009 Phase II awardees will be invited in next year's meeting.
  
- Also included are four talks related to the NP user facilities, their capabilities and needs in view of the NP SBIR program.

# Agenda

## DOE-NP SBIR/STTR Exchange Meeting

September 13-14, 2010

Hilton Washington DC North/Gaithersburg - Montgomery Ballroom

Time	Dur.	Presentation Title	Speaker	Organization	NP SBIR/STTR Topic
<b>Monday, September 13, 2010</b>					
8:30 AM	5	Welcome Remarks	Timothy J. Hallman	DOE, Office of Nuclear Physics	
8:35 AM	15	SBIR/STTR Program Overview	Jehanne Gillo	DOE, Office of Nuclear Physics	
8:50 AM	30	NP SBIR/STTR Program	Manouchehr Farkhondeh	DOE, Office of Nuclear Physics	
9:20 AM	25	Development of 500 MHz Multi-Channel Readout Electronics for Fast Radiation Detectors	Wolfgang Hennig	XIA, LLC	Electronics
9:45 AM	25	New Detector for Gamma Ray and Neutron Studies	Kanai Shah	Radiation Monitoring Devices, Inc.	Instrumentation
10:10 AM	25	Progress with Growth of Super-Conducting Films of Nb and Nb3Sn Using Energetic Condensation	Mahadevan Krishnan	Alameda Applied Sciences Corp.	Accelerator Tech.
<b>10:35 AM</b>	<b>35</b>	<b>Coffee Break</b>			
11:10 AM	30	<b>RHIC facility and the SBIR/STTR Program</b>	Ilan Ben-Zvi	Brookhaven National Laboratory	<b>NP User Facilities I (RHIC)</b>
11:40 AM	25	Integrated Multiple Effects Software for Nuclear Physics Applications	David Smith	Tech-X Corp.	Accelerator Tech.
12:05 PM	25	Development of SRF Multi-Spoke Cavities for Electron Linacs	Terry Grimm	Niowave, Inc.	Accelerator Tech.
<b>12:30 PM</b>	<b>65</b>	<b>Lunch Break</b>			
1:35 PM	30	<b>TJNAF facility and the SBIR/STTR Program</b>	Andrew Hutton	Thomas Jefferson National Accelerator Facility	<b>NP User Facilities II (TJNAF)</b>
2:05 PM	25	Overview of Computational Challenges for Coherent Electron Cooling	David Bruhwiler	Tech-X Corp.	Accelerator Tech.
2:30 PM	25	Progress on a Magnetometer for the nEDM Experiment	David (Chris) Hovde	Southwest Sciences, Inc.	Instrumentation
2:55 PM	25	Superconducting Sensor Development in Support of the Search for the Neutron Electric Dipole Moment	Robin Cantor	STAR Cryoelectronics, LLC	Instrumentation
3:20 PM	25	Integrated Spin System for Production of Large Quantities of Stable Isotopes	Alfred Wong	Nonlinear Ion Dynamics, LLC	Instrumentation
<b>3:45 PM</b>	<b>35</b>	<b>Coffee Break</b>			
4:20 PM	30	<b>NP Low Energy Facilities and the SBIR/STTR Program</b>	David Radford	Oak Ridge National Laboratory	<b>NP User Facilities III (Low Energy)</b>
4:50 PM	20	Fast, Low Noise Photodetectors for Nuclear Physics	Kanai Shah	Radiation Monitoring Devices, Inc.	Instrumentation
5:10 PM	20	Development of a Low Frequency SRF Electron Gun	Terry Grimm	Niowave, Inc.	Accelerator Tech.
<b>5:30 PM</b>		<b>Adjourn</b>			

## Presentation Notes

- We have a tight and busy agenda and must stay on time for each presentation.
- Sessions will start sharply at the time stated on the agenda. Please take your seat few minutes before the start of each session to allow the first presentation to begin on time.
- Make sure your presentation file is uploaded on the display laptop before the start of your session.
- For Q&A sessions, please make your comments /questions short and use the coffee breaks and lunch breaks for follow ups.

Total presentation (min)	Presentation (min)	Q&A (min)	5 and 2 minutes warning @ (min)
30	20	10	15 and 18
25	18	7	13 And 16
20	14	6	9 and 12

## SBIR/STTR

**SBIR:** Small Business Innovation Research      **STTR:** Small Business Technology Transfer.

- **SBIR:** Set-aside program for small business (SB) to engage in federal Research and Development (R&D) with potential for commercialization. (Participations: **SB:** minimum 66 % for Phase I and 50% for Phase II, **RI:** optional )
  - **STTR:** Set-aside program to facilitate cooperative R&D between small business and U.S. research institutions (RI) with potential for commercialization. (Participations: **SB:** minimum 40%, **RI:** minimum 30%)
  - **“Both”:** submitted for consideration as SBIR or STTR (both). Must satisfy the minimum participation requirements listed above for both SBIR and STTR.
- 
- These programs include competitions among small businesses that submit R&D grant applications in response to technical topics in an annual solicitation.
  - To fund these Congressionally-mandated programs, a small percentage of the extramural R&D budget (~ 2.5% for SBIR, 0.30% for STTR) is set aside within each DOE technical program that participates.
  - Prior to FY 2010: maximum SBIR/STTR award limits were \$100k for Phase I and \$750k for Phase II.
  - 2010: The maximum SBIR award amounts were raised to \$150k and \$1000k for Phase I and Phase II respectively.

## Current SBIR/STTR Status

### Phase I

Grant	Max award (\$k)	Small Business (Level of Effort)	Research Institution (Level of Effort)
SBIR	150	Min 66%	Optional
STTR	100	Min 40%	Min 30%

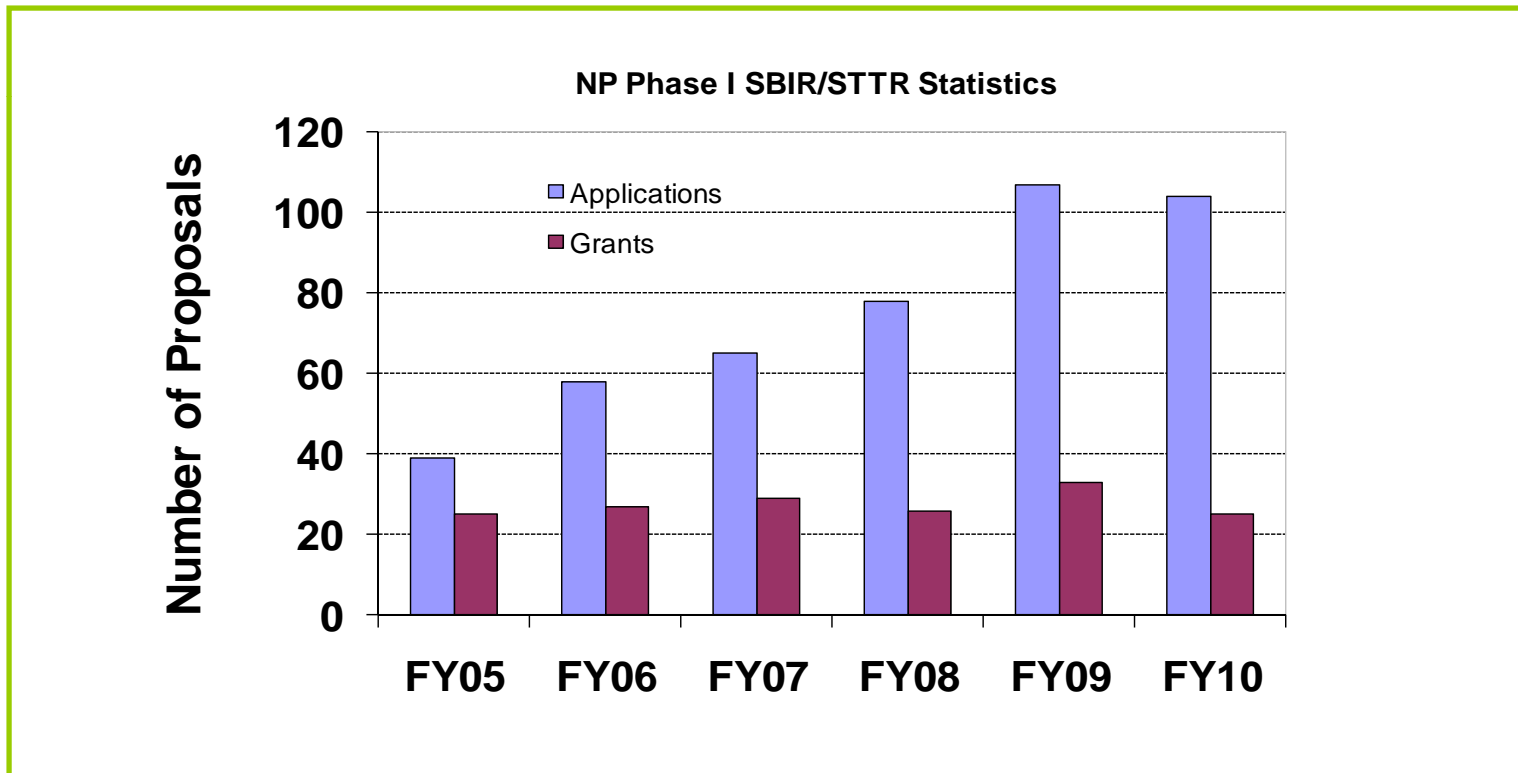
### Phase II

Grant	Max award (\$k)	Small Business (Level of Effort)	Research Institution (Level of Effort)
SBIR	1000	Min 50%	Optional
STTR	750	Min 40%	Min 30%



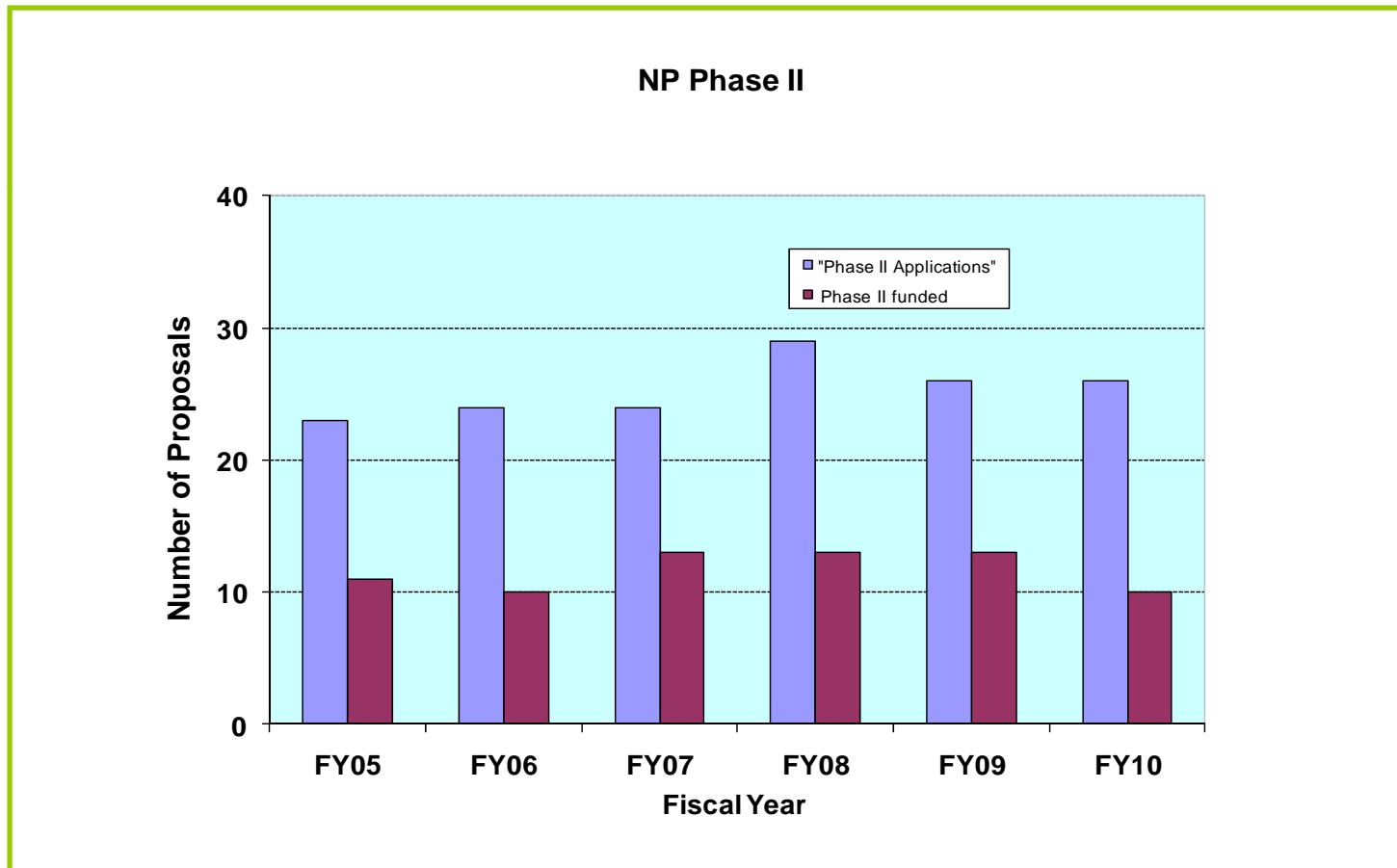
## NP Phase I SBIR/STTR Applications and Awards

- NP received a Total of **104** phase I proposals in FY 2010, with over 350 reviews.
- Increases of max SBIR award amounts in FY 2010 are to provide adequate funding of grants. These increases will also result in a reduction in number of Phase I grants that can be funded each year.



## NP Phase II SBIR/STTR Applications and Awards

The increases in maximum SBIR award amounts started in FY 2010 will also affect number of phase II awards that can be supported.



## NP SBIR/STTR Topics

- Software and Data Management
- Electronics Design and Fabrication
- Accelerator Technology
- Instrumentation, Detection Systems and Techniques
- Isotope Science and Technology

## NP Topic 1

### Software and Data Management

- a. Large Scale Data Storage
- b. Large Scale Data Processing and Distribution
- c. Grid and Cloud Computing
- d. Software-driven Network Architectures for Data Acquisition (new)

#### FY10 Phase I

FY10	SBIR	STTR	“Both”	Total
# of Applications	4	1	1	6
# of Awards	0	0	0	0

## NP Topic 2

### Electronics Design and Fabrication

- a. Advances in Digital Electronics
- b. Circuits
- c. Advanced Devices and Systems
- d. Active Pixel Sensors
- e. Manufacturing and Advanced Interconnection Techniques

#### FY10 Phase I

<b>FY10</b>	<b>SBIR</b>	<b>STTR</b>	<b>“Both”</b>	<b>Total</b>
# of Applications	19	1	4	24
# of Awards	5	1	0	6

## NP Topic 3

### Accelerator Technology

- a. Materials and Components for Radio Frequency Devices
- b. Radio Frequency Power Sources
- c. Design and Operation of Radio Frequency Beam Acceleration Systems
- d. Particle Beam Sources and Techniques
- e. Polarized Beam Sources and Polarimeters
- f. Rare Isotope Beam Production Technology
- g. Accelerator Control and Diagnostics
- h. Novel acceleration methods for ions (new)

#### FY10 Phase I

<b>FY10</b>	<b>SBIR</b>	<b>STTR</b>	<b>“Both”</b>	<b>Total</b>
# of Applications	34	3	5	42
# of Awards	11	1	1	13

## NP Topic 4

### Instrumentation, Detection Systems and Techniques

- a. Advances in Detector and Spectrometer Technology
- b. Position Sensitive Charge Particle and Gamma Ray Tracking Devices
- c. Technology for Rare Particle Detection
- d. Large Band Gap Semiconductors, New Bright Scintillators, Calorimeters, and Optical Elements
- e. Specialized Targets for Nuclear Physics Research
- f. Technology for High Radiation environment of Rare Isotope Beam Facility.

#### FY10 Phase I

<b>FY10</b>	<b>SBIR</b>	<b>STTR</b>	<b>“Both”</b>	<b>Total</b>
# of Applications	20	4	4	28
# of Awards	4	0	1	5

## NP Topic 5

### Isotope Science and Technology

- a. Novel or improved production techniques for radioisotopes or stable isotopes
- b. Improved radiochemical separation methods for preparing high-purity radioisotopes

#### FY10 Phase I

<b>FY10</b>	<b>SBIR</b>	<b>STTR</b>	<b>“Both”</b>	<b>Total</b>
# of Applications	1	0	2	3
# of Awards	0	0	1	1



## Examples of current Phase II Grants relevant to NP Major Item of Equipment (MIE)

- **nEDM** (neutron Electric Dipole Moment):
  - Magnetometer for nEDM Exp. by Southwest Sciences, Inc.
  - Next-Generation Readout Electronics for nEDM, by STAR Cryoelectronics, LLC
- **Majorana:**
  - $^{76}\text{Ge}$  Isotope purification using plasma technique by Nonlinear Ion Dynamics LLC.
  - High-Purity Germanium crystals for low Background counting arrays, PHDs Co.
- **Double-beta decay:**
  - Neodymium-containing ( $^{150}\text{Nd}$ ) for neutrinoless  $2\text{-}\beta$  decay detection (cryogenic bolometer: DUSEL) by Integrated Photonics.
- **PRIMEX-TJNAF:**
  - Optical detector with integrated ADC for digital readout by Radiation Monitoring Devices.
- **Electron Ion Collider:**
  - Designing a coherent electron cooling system for high-energy hadron colliders by Tech-X Co.
- **SRF cavity:**
  - Development of a superconducting RF multi-spoke cavities for electron linacs, by Niowave Inc.

## NP yearly SBIR/STTR topic development process

- Start with current year published topic document and make initial revisions based on year-round NP community input and the Program Manager observations,
- Request input for each topic from individuals within the NP community,
- Collect and implement all inputs on existing subtopics. Add and/or delete subtopics as necessary,
- Submit the revised topics to DOE SBIR/STTR office; and
- After further iteration with the SBIR/STTR office, the solicitation is published as a Funding Opportunity Announcement (FOA) around the third week of September (This year will be published later).

## Notes on “Final Reports”

➤ When preparing the “Final Report” for your grant, make sure the following items are included in addition to what the instruction explicitly asks for.

- a. List the original tasks with brief description of each as they were originally proposed in the grant application.
- b. A short description of accomplishments for each task indicating the degree to which each task was accomplished. Include a short description if a listed task was not accomplished or was modified.
- c. Add to the cover page the phrase "Grant supported by DOE office of Nuclear Physics”.

➤ These items should add only few pages to the report but provide a valuable reference and structure in the report by connecting the original tasks to the accomplishments.

➤ Reports are normally returned for revisions if above items not included.

Back up Slides

Tuesday, September 14, 2010					
8:30 AM	25	The Development of an Inexpensive Compact Neutron Generator for Gamma Calibration and Other Applications	Melvin Piestrup	Adelphi Technology, Inc.	Instrumentation
8:55 AM	25	Germanium Detector Systems and Germanium Crystals for Nuclear Physics Research	Ethan Hull	PHDs Co.	Instrumentation
9:20 AM	25	High Performance Lossy Dielectric HOM Absorbers for SRF Cavities	Ender Savrun	Sienna Technologies, Inc.	Accelerator Tech.
9:45 AM	25	Development of Plasma Panel Based Radiation Detectors for Nuclear and High Energy Physics, Medical Imaging and Homeland Security	Peter Friedman	Integrated Sensors, LLC.	Instrumentation
10:10 AM	25	Modeling of Signal Generation in Gamma-Ray Detectors	Paul Mallowney /Cory Ahrens	Tech-X Corp.	Instrumentation
10:35 AM	35	<b>Coffee Break</b>			
11:10 AM	30	NP Isotope program and facilities and the SBIR Program	Robert Atcher	National Isotope Development Center	NP Isotope Facilities
11:40 AM	25	High Rate Digital Signal Processing for Multi-Channel Microcalorimeters	Hui Tan	XIA, LLC	Electronics
12:05 PM	25	Solid-State Photomultiplier with Integrated Front End Electronics	James Christian /Erik Johnson	Radiation Monitoring Devices, Inc.	Electronics
12:30 PM	65	<b>Lunch Break</b>			
1:35 PM	25	Multi-Cavity Proton Cyclotron Accelerator	Jay Hirshfield	Omega-p, Inc.	Accelerator Tech.
2:00 PM	25	Customizable Web Service for Efficient Access to Distributed Nuclear Physics Relational Databases	Mark Green	Tech-X Corp.	Software
2:25 PM	20	The Properties of Cryogenic CMOS Avalanche Photodiodes	James Christian /Erik Johnson	Radiation Monitoring Devices, Inc.	Instrumentation
2:25 PM	25	Porous Refractory Materials as Potential Catchers for the Fast Release of Unstable Light Nuclei	Uma Sampathkumaran	Innosense, LLC	Accelerator Tech.
2:50 PM	25	Some Aspects of Phase-I and Phase-II Research Performed by I.C. Gomes C&I Inc.	Itacil Gomes	I.C. Gomes Consulting & Investment, Inc.	Accelerator Tech.
3:15 PM	35	<b>Coffee Break</b>			
3:50 PM	25	Integrated Modeling Tool of ECR Charge Breeder Ion Sources	Jin-Soo Kim	Far-Tech, Inc.	Accelerator Tech.
4:15 PM	25	New VORPAL Modeling Capabilities for 3D Multiscale Simulations of Charge Gain and Transport in Diamond Devices	Dimitre Dimitrov	Tech-X Corp.	Accelerator Tech.
4:40 PM	15	<b>Closing Remarks</b>			
4:55 PM		<b>Meeting Adjourns</b>			