

Establishing the scientific basis for fusion energy  
and understanding the plasma universe

# *DOE/FES* *Perspectives*

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Fusion Energy Sciences Advisory Committee  
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- This is a critical time for the program
- The program must evolve, although the Administration budget outlook is challenging
- ITER has immense challenges, yet it is the vehicle for our next step

***The role of FESAC in providing sound advice is very important for enabling us to develop the path forward***



- **TODAY:**
  - Receive report of FESAC Strategic Planning Subcommittee
- **TOMORROW:**
  - Special talk on BER Multidisciplinary Team Science by Sharlene Weatherwax (Assoc Director, Biological and Environmental Research)
  - Talk on ITER Project Progress by Brad Nelson (USIPO)
  - Talk on 2014 COV Status by Amitava Bhattacharjee
  - Further discussion of Strategic Planning Subcommittee report



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# Programmatic Developments



# New budget structure organized by scientific topics is being approved

## *Burning Plasma Science*

**Foundations** Focusing on domestic capabilities; major and university facilities in partnership, targeting key scientific issues. Theory and computation focus on questions central to understanding the burning plasma state

**Challenge:** Understand the fundamentals of transport, macro-stability, wave-particle physics, plasma-wall interactions

**Long Pulse** Building on domestic capabilities and furthered by international partnership

**Challenge:** Establish the basis for indefinitely maintaining the burning plasma state including: maintaining magnetic field structure to enable burning plasma confinement and developing the materials to endure and function in this environment

**High Power** ITER is the keystone as it strives to integrate foundational burning plasma science with the science and technology girding long pulse, sustained operations.

**Challenge:** Establishing the scientific basis for attractive, robust control of the self-heated, burning plasma state

## *Discovery Science*

### **Plasma Science Frontiers & Measurement Innovation**

General Plasma Science, Exploratory Magnetized Plasma, High Energy Density Laboratory Plasma, and Measurement Innovation



# GAO assessment of ITER cost and schedule

- **Senate request to Government Accountability Office in May 2013**
- **Final GAO report issued June 2014**
  - *Fusion Energy: Actions Needed to finalize Cost and Schedule Estimates for U.S. Contributions to an International Experimental Reactor*
- **Four recommendations (accepted by the Office of Science)**
  - Revise and update the project's cost estimate to meet all characteristics of high-quality, reliable cost estimates
  - Develop and present at the next ITER Council Meeting a formal proposal describing the actions DOE believes need to be taken to set a reliable international project schedule and improve ITER Organization project management
  - Use that schedule, if reliable, to propose a final, stable funding plan for the U.S. ITER Project, approve a performance baseline with finalized cost and schedule estimates, and communicate this information to Congress
  - Set a specific date for completing, in a timely manner, a strategic plan for the U.S. fusion program that addresses DOE's priorities for the overall U.S. fusion program in light of U.S. ITER Project costs, and involve the Fusion Energy Sciences Advisory Committee in the development of the plan
- **Overall:**
  - USIPO schedule estimates "fully reflect" best practices
  - USIPO cost estimates "substantially met" best practices for comprehensive, well documented, and accurate estimates



- **The 2013 Management Assessment report had 11 recommendations**
- **To develop its response, the ITER Council set up working groups:**
  - Succession Planning
  - Management Performance
  - Improved ITER Organization/Domestic Agency Interactions
- **A Selection Board was formed to initiate the succession process for the Director General**
  - Dr. Thom Mason is the U.S. member of the Committee.
  - The ITER Director-General Selection Committee met for the first time in Paris on July 15, 2014, with the ITER Council Chair, Dr. Bob Iotti, present as an observer.
    - The Committee selected Dr. Robert Aymar (EU, former CERN Director General) as the Committee Chair from among the committee members.
    - The Committee agreed on a path forward and began to officially accept and assess candidates in August.
  - The Committee met again in September in Beijing.
  - The goal is to have a selected candidate be approved by the ITER Council at its November 2014 meeting



- Senate and Congress passed a short-term continuing resolution for FY 2015 to fund programs through December 11
  - FES is working on funding allocations based on the CR
- 25th IAEA Fusion Energy Conference (13 -18 October 2014, St. Petersburg, Russia)
  - Guidance was received that only DOE grantees and others who are not federal or Laboratory employees may attend
  - Thanks to the replacement speakers who will present the invited talks (and posters) from national laboratories





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# FES Office Developments



- **New position openings:**
  - **Physical Scientist/Physicist** GS-14/15 position
    - Seeking “a recognized scientific authority and expert in magnetic confinement of high-temperature plasmas and the operation of large toroidal magnetic fusion science experimental facilities”.
    - Position is posted at USAJobs; applications are being accepted starting September 22 for 10 business days
  - **Program Analyst**, GS-11/12/13
    - Replacement for Debra Frame (international collaboration agreements)
    - FES is working to prepare the posting for this position

# Summer undergraduate internships at FES

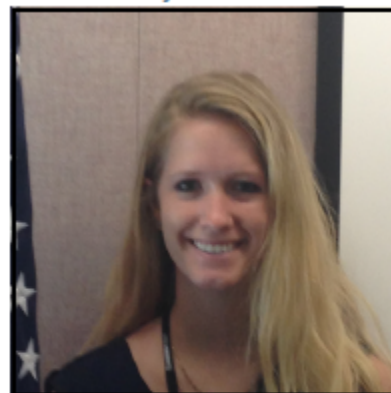
FES hosted  
three summer  
interns this  
year

Dorothy Woods



(SC-24) FES  
Tougaloo College  
Mathematics/Education

Michelle Lyman



(SC-24) FES  
Penn State University  
Forensic Science/ Biology Option

Darius Stanton



(SC-24) FES  
Clafin University  
Environmental Science/Political  
Science

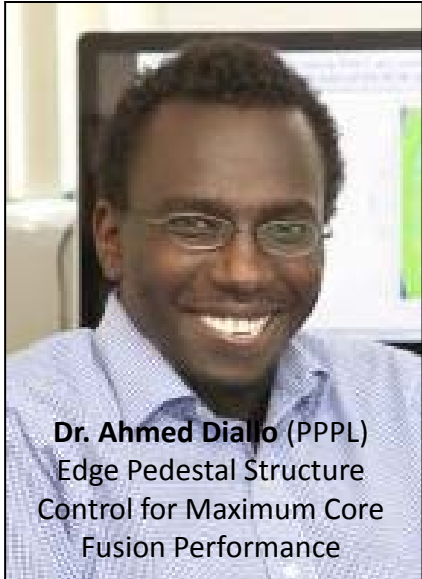
- The interns wrote white papers on (1) an analysis of metrics of fusion energy sciences research programs at U.S. institutions and (2) an analysis of overseas program developments in fusion science, and gave several presentations to the FES on the results of their work, which will be useful input for the upcoming COV
- FES encourages applications for next year

# Status of recent solicitations

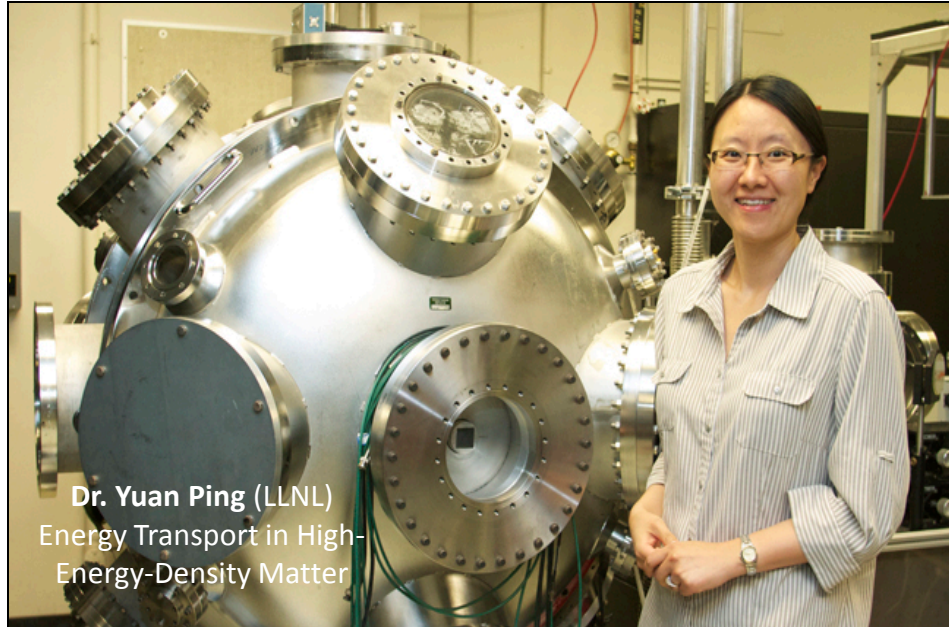
Solicitation	Status	Announced \$	FES POC
NSF-DOE Partnership in Basic Plasma Science and Engineering	9 awards from FES 7 awards from NSF	\$3,400,000 \$1,000,000	GPS Team
FES-ASCR SciDAC Partnership in Multi-scale Integrated Modeling	1 multi-institutional award (full funded)	\$2,250,000 (FES) \$1,500,000 (ASCR)	J. Mandrekas
Theoretical Research in Magnetic Fusion Energy Science	Proposals are under review	\$3,200,000	J. Mandrekas
Collaborative Research in Magnetic Fusion Energy Sciences on Long-Pulse International Stellarator Facilities	Proposals due Sept 22	\$500,000	S. Barish
SC/NNSA Joint Program in High Energy Density Laboratory Plasma Science	Proposals due Oct 1	TBD	S. Finnegan
SBIR/STTR Phase I	Proposals due Oct 14	TBD	B. Sullivan
Early Career Research Program	Proposals due Nov 20		N. Podder
SBIR/STTR Phase II	Proposals due Dec 9	TBD	B. Sullivan



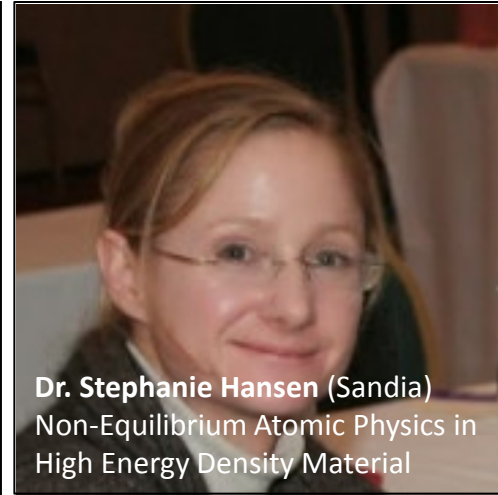
# Recent Early Career Awards for Fusion Energy Sciences



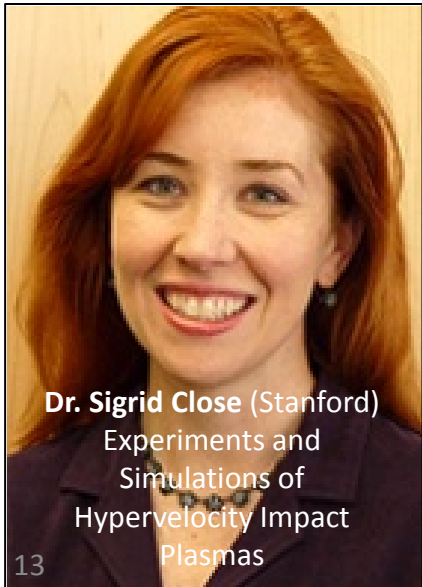
**Dr. Ahmed Diallo (PPPL)**  
Edge Pedestal Structure  
Control for Maximum Core  
Fusion Performance



**Dr. Yuan Ping (LLNL)**  
Energy Transport in High-  
Energy-Density Matter



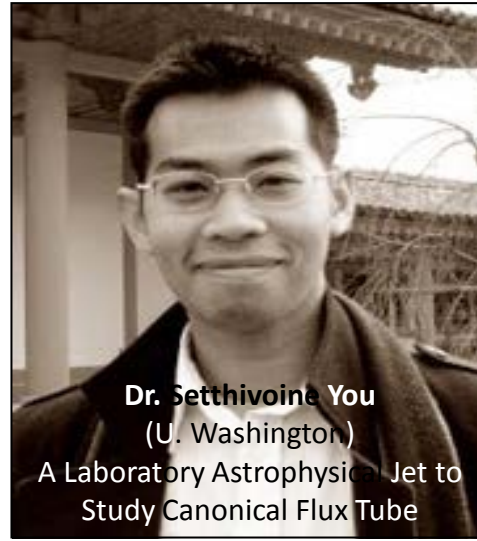
**Dr. Stephanie Hansen (Sandia)**  
Non-Equilibrium Atomic Physics in  
High Energy Density Material



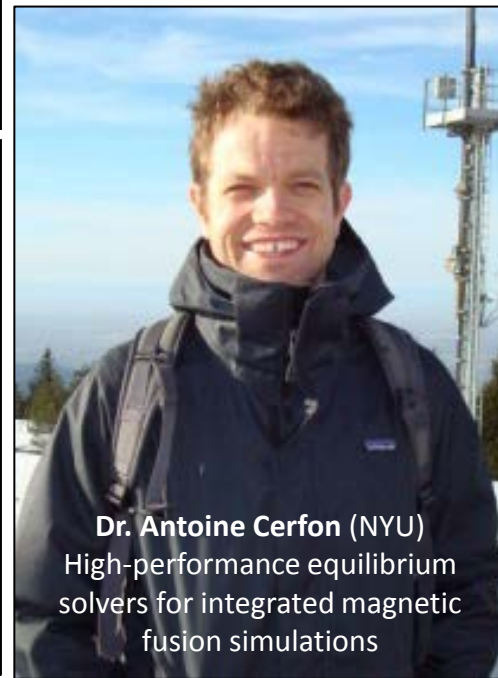
**Dr. Sigrid Close (Stanford)**  
Experiments and  
Simulations of  
Hypervelocity Impact  
Plasmas



**Dr. Brian Grierson (PPPL)**  
Exploration of Main-Ion  
Properties at the Boundary of  
Fusion Reactors



**Dr. Setthivoine You  
(U. Washington.)**  
A Laboratory Astrophysical Jet to  
Study Canonical Flux Tube



**Dr. Antoine Cerfon (NYU)**  
High-performance equilibrium  
solvers for integrated magnetic  
fusion simulations



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# FESAC Developments



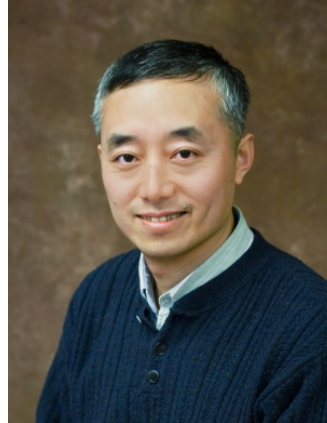
# This year's outgoing FESAC members



**Ray Fonck**



**Amanda Hubbard**

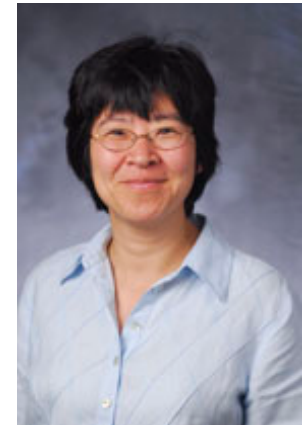


**Hantao Ji**



**Ramon Leeper**

Retiring Member	Institution	On FESAC Since
Ray Fonck	Wisconsin	August 2010
Amanda Hubbard	MIT	August 2008
Hantao Ji	PPPL	August 2008
Ramon Leeper	LANL	January 2009



**Minami Yoda (Georgia Tech)  
Ex-officio, Fusion Division, ANS**



# New FESAC members as of June 2



**Troy Carter (UCLA)**



**Arati Dasgupta (NRL)**



**Chris Hegna (Wisconsin)**



**Valerie Izzo (UCSD)**



**Gertrude Patello (PNNL)**



**Susana Reyes (LLNL)**  
**Ex-officio, Fusion Division, ANS**



**Don Rej (LANL)**





- A charge on a Committee of Visitors to review the entire FES program was issued by Acting SC-1 on April 8, 2014
- 
- The membership for the FESAC subcommittee to address this charge is complete
- Prof. Amitava Bhattacharjee (Princeton University & PPPL) will be the chair
- The COV visit to FES is scheduled for December 2-4, 2014



- **Sincere thanks for:**
  - Tremendous amount of work, accomplished in a compressed schedule
  - Extensive, helpful community input
  - Dedicated leadership within the subcommittee
- **Sincere need for:**
  - Focused, objective, informed, clear recommendations on program priorities



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*Thank you*