

# *Nuclear Notes*

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**Nuclear Engineering  
400 Central Drive  
West Lafayette, IN  
47907**

## A Message from the Interim Head



August 2008

Newsletter Date

I would like to welcome everyone back to the Purdue Campus and the School of Nuclear Engineering. I hope everyone has had an enjoyable and productive summer .

As you walk through the department you will see several new research and teaching laboratories. The faculty received notice of over 4 million dollars in new research and teaching grants this summer making this our best year ever.

In addition we have over 132 undergraduate and 56 graduate students for a total of 188, the largest number of students ever.

Please join us in the Nuclear Renaissance!



## Funding Opportunities

**Y. Chen & I. Jovanovic**—\$2,000,000—NSF—Graphene Based Sensors for Detecting Special Nuclear Materials

**J. P. Allain and I. Jovanovic and A. Fentiman**—\$330,000—NRC Faculty Development Grant

**T. Jevremovic**—\$85,000—NRC—Development of Educational Undergraduate Course Modules for Interactive Reactor Physics, 1 year

**T. Jevremovic**—\$198,720—NRC—Nuclear Engineering and Health Sciences Scholarship Support Program at Purdue University, with the School of Health Sciences, 1 year

**M. Ishii**—\$25,000—National Academy for Nuclear Training—National Academy for Nuclear Training Fellowships—August 15, 2008 to August 14, 2009

**A. Hassanein**—\$120,000—DOE—Impact of Disruptions and ELMS on Liquid Lithium Surfaces in NSTX and Mitigation/Extrapolation to ITER Relevant Conditions—May 15, 2008 to May 14, 2009

**T. Hibiki**—\$16,375—Purdue Research Foundation XR Grant—Lift Force Modeling of Multi-particle Systems for Three-Dimensional Simulation of Nuclear Reactor Thermal-Hydraulic Phenomena—June 1, 2008 to May 31, 2009

**S. Revankar**—\$588,980—International Beryllium Corporation—Development and Thermal Characterization of Enhanced Thermal Conductivity UO<sub>2</sub>-BeO Fuel—September 1, 2008 to August 31, 2010

**T. Hibiki and M. Ishii**—\$130,000—Mitsubishi Heavy Industries, LTD—Study on Unsteady Gas-Liquid Two-Phase Flow and Flow-Induced Vibration—July 1, 2008 to March 31, 2009

**M. Ishii**—\$199,891—Westinghouse Electric Corp Sponsor Award—Air Entrainment in the Flow of an Emergency core Cooling Suction, Phase 2—July 1, 2008 to December 21, 2008

**T. Jevremovic**—PRF XR Research Grants—Computationally Intensive and Experimentally Driven Proof of Concept for the Novel Radiation Binary Targeted Therapy Applied to the Advanced Breast Cancers—June 1, 2007 to May 31, 2008



## Funding Opportunities

**I. Jovanovic**—\$135,968—DARPA—Direct Temporal Pulse Shaping Via Phase-Sensitive Three-Wave Mixing—May 28, 2008 to November 11, 2009

**J. P. Allain**—\$90,000—Department of Energy—In-situ Elemental and Chemical Characterization of D-recycling on Lithiated Graphitic Surfaces with Applications to NSTX—May 15, 2008 to May 14, 2009

**A. Hassanein**—\$115,000—US Department of Energy—Hydrodynamic and Shock Heating Instabilities of Liquid Strippers for RIA—July 1, 2008 to June 30, 2009

**M. Ishii—T. Hibiki**—\$105,000—Mitsubishi Heavy Industries, LTD.—Study on countercurrent Gas-Liquid Two-Phase Flow—July 1, 2008 to March 31, 2009

### Increase in funding:

**M. Ishii**—\$59,500—NRC—NRC Task Order 001, 002, 003, 004

**M. Ishii—T. Hibiki**—\$105,00—Mitsubishi Heavy Industries Ltd

**M. Ishii—T. Hibiki**—\$90,000—Tokyo Electric Power Co. Inc.

**T. Jevremovic, L. Tsoukalas, C. Choi and R. Gao**—\$43,183—NSF/DNDO

## Papers



J.J. Jeong, **B. Ozar**, **A. Dixit**, J.E. Julia, **T. Hibiki**, **M. Ishii** “Interfacial area transport of vertical upward air-water two-phase flow in an annulus channel”, International Journal of Heat and Fluid Flow 29 (2008) 178-193.

Byong-Jo Yun, Goon-Cheri Park, J. Enrique Julia, and **Takashi Hibiki**, “Flow Structure of Subcooled Boiling Water flow in a Subchannel of 3 x 3 Rod Bundles”, Journal of Nuclear Science and Technology, Vol. 45, No. 5 p. 402-422 (2008).

Tae-Ho Lee, Byong-Jo Yun, Goon-Cheri Park, Seong-O Kim and **Takashi Hibiki**, “Local Interfacial Structure of Subcooled Boiling Flow in a Heated Annulus”, Journal of Nuclear Science and Technology, Vol. 45, No. 7, p. 683-697 (2008).

**B. Ozar**, J. J. Jeong, **A. Dixit**, J.E. Julia, **T. Hibiki**, **M. Ishii**, “Flow Structure of gas-liquid two-phase flow in an annulus”, Chemical Engineering Science 63 (2008) 3998-4011.

## Departmental News:

The department has acquired a new Linux computer cluster names curie (after Madam Curie). The cluster consists of 64 processors to perform high end parallel computing. It will be used for research in nuclear physics, material science and computational fluid dynamics.

NE Faculty/Staff Retreat was held on Friday August 22, 2008. This was a successful and positive event. In addition the ideas generated should help us plan and set our priorities for the new academic year. You can access information from the retreat via our NE Internet at the below link.

<https://engineering.purdue.edu/Intranet/Groups/Schools/NE>

Go to Departmental Resources, NE Faculty/Staff Retreat.

We look forward to our next retreat!

## Faculty Promotions



Congratulations to Dr. Revankar on your promotion to Professor from Associate Professor.

## Faculty Departures

We would like to announce the resignation of Dr. Tom Downar from the faculty of Nuclear Engineering at Purdue. Tom has recently accepted a position as professor in the Nuclear Engineering Department at the University of Michigan beginning early this fall. We wish him and his family the best of luck in this new position and look forward to his continued collaboration with faculty and students at Purdue University.

## Awards



Congratulations to Dr. Allain on receiving the 2008 Best Teacher Award.



Congratulations to Vivek Agarwal for winning first prize for his poster entitled “ An experimental Measurement of Power Consumption in Facility Sensor Network” which was presented at the Advanced Manufacturing Summit-VI on May 6, 2008.



Congratulations to Nader Satvat and Brian Archambault for receiving the 2008 Magoon Award.

Lenka Kollar was awarded the National Academy for Nuclear Training Scholarship for the 2008-2009 Academic year.

Brian Ade was awarded one of the Advanced Fuel Cycle Initiative (AFCI) Fellowship for 2008.

## New Faces in Nuclear Engineering

We would like to welcome the following to the Nuclear Engineering Department:



Dr. Gennady Miloshevsky as a Research Scientist working with Dr. Hassanein.

Dr. Sivanandan Harilal as a Research Assistant Professor working with Dr. Hassanein.

### Incoming Grad Students for Fall 08:

Brian Ade	Xiaohong Yang
Khaled Al-shboul	Zhangcan Yang
Caleb Brooks	Jinho Choi
David Campos	
Michael Foxe	
Doug French	
Goujing Hou	
Zun Huang	
Chase Taylor	

## ANS News

### ANS Officers:

President—Abbey Donahue  
 Vice President—Sheila Bolbolan  
 Treasurer—Charlton Campbell  
 Secretary—David DeBruce

### Class Representatives:

Senior Class Rep—Melissa Strehle  
 Junior Class Rep—Tom Grimes  
 Soph Class Rep—Jeremiah Gill

### Committee Chairs:

Special Events Chair—Brian Miller  
 Outreach Chair—Robert Jackson  
 Corporate Chair—Stephanie Meyer

# Congratulations

Congratulations to our graduates.

## Masters

Ben Collins  
Zhenjia Gao  
Christopher Glass  
Nathan Lafferty  
Andrew Shoaf

## PhD

Shilp Vasavada  
Kyoung Suk Woo



## BSNE

Kevin Chesterfield  
Josh Coleman  
Randall Johnson



## Jovanovic Group News—August 2008

### New projects funded.

In collaboration with Prof. Y. Chen from Department of Physics, we have received a 5-year, \$2M award to develop a novel radiation sensing technology by use of the field effect. The project is going to utilize the sharp change in electrical conductivity of the newly discovered material graphene to try to overcome several limitations of conventional semiconductor detectors. The project is funded by the National Science Foundation and the Domestic Nuclear Detection Office of the Department of Homeland Security.

In collaboration with Profs. Fentiman and Allain, we have received a two-year, \$165,000 award for faculty development from the Nuclear Regulatory Commission. The funds will be used to upgrade the existing ultrafast laser infrastructure in NEILL to approach terawatt peak power operation milestone. The funds are supplemented with the Purdue University Nuclear Engineering Young Scholar Award of \$15,000.



### Doug French receives the Ross Fellowship.

Doug French has received a prestigious Ross fellowship, which supports the first year of his graduate study with a

full tuition, fees, and a stipend.

### Prof. Jovanovic receives the IGCC fellowship.

Prof. Jovanovic has received a fellowship from the University of California's Institute on Global Conflict and Cooperation, which he used to attend the Public Policy and Nuclear Threats program at UC San Diego in July.

### SURF program.

Shama Huda (University of Arkansas) joined us this summer through the SURF program. She has completed the computer interface of numerous instruments and conducted the interpulse coherence measurement on a femtosecond oscillator.

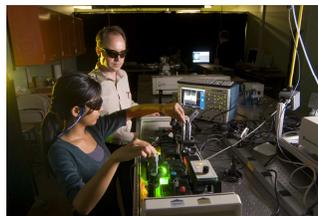


Fig.1. Shama Huda participated in the SURF program.

### Two positions for graduate students open.

As a result of the recently awarded projects, we have two positions for graduate students open in the area of ultrafast laser science and radiation detection. For details please consult Prof. Jovanovic's web page.

### New equipment

Our group has received a new high repetition rate Q-switched Nd:YAG laser on a long term loan from the Lawrence Livermore

National Laboratory. This system will be used to explore novel pumping geometries for Ti:sapphire fibers.

### NEILL commissioning.

The commissioning of the ultrafast laser sources and instrumentation in NEILL is now complete. We have acquired additional diagnostics, hardware, and optics. The sapphire fiber experiments have begun, while we have started the construction of the phase-sensitive three-wave mixing experiments.

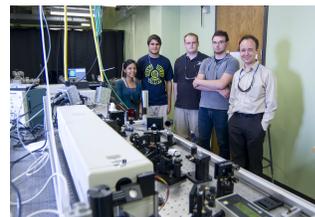


Fig. 2. The NEILL summer research team

### Undergraduate research positions open.

We have a number of experimental and modeling positions open for undergraduate students in support of our research programs.

### nTPC detector produces 3-dimensional data.

The nTPC detector constructed as a part of our collaboration with LLNL is now producing 3-dimensional data. We have also reported our progress with this experiment in an oral talk at the Symposium on Radiation Measurements and Applications at the University of California, Berkeley in July.

## AFROTC Professional Development Training Program to Thule AB, Greenland

The purpose of traveling to Thule AB, Greenland was to perform various experiments before, during, and after the August 1, 2008 solar eclipse. It was necessary to travel to this location because this site was predicted to have 98.3% totality. The group consisted of Purdue professors and cadets, Air Force Academy professors and cadets, as well as professionals from around the country. The experiments were conducted to determine if radioactive decay is affected by solar activity. It had been observed that the sun's influence on earth as a result of solar flares or the earth moving closer and farther away from the sun could affect the rate of radioactive decay. Thus, it was hypothesized that during a solar eclipse the moon would block the sun in a way that would also affect the rate of radioactive decay. The experiments were successful in recording data, but it will take time to analyze the data and reach a conclusion.

Below are some pictures of the trip that Jere Jenkins took to Greenland along with Ephraim Fischbach (Physic's Department PU)



SEAT collaboration at Thule AB, 516 wing of KC-135

## AFROTC Professional Development Training Program to Thule AB, Greenland (continued)



At Camp Tuto, next to the icecap, where we set up our E-field sensor. Sustained winds were above 60 knots that day.



Standing in the middle of the only runway in the world that is painted white, with red markings. The runway has to be painted white because it sits atop permafrost, and if it wasn't white, it could get too hot and sink into the permafrost. Pictured: Dr. Tom Gruenwald (left), Jere Jenkins and Prof. Ephraim Fischbach (Physics Department PU)



Some of our experiments



The group at the BMEWS (Ballistic Missile Early Warning System) station.

# Calendar

## August

- 18th—Faculty due back
- 20th—Faculty Meeting—3:30 p.m. NUCL 140A
- 22nd—Faculty and Staff retreat—8:30 a.m. Dauch Alumni Center
- 25th—Fall classes begin
- 27th—Colloquium—Dr. Bralts—3:30 p.m. WTHR 172

## September

- 1st University Holiday
- 3rd—Faculty Meeting—3:30 p.m. NUCL 140A
- 9th—10th—Industrial Roundtable
- 10th—Colloquium—Andy Karam—3:30 p.m. WTHR 172
- 17th—Colloquium—Joseph Wambold—3:30 p.m. WTHR 172
- 20th—Purdue Family Day
- 28th—29th—Grad Big 10+ Expo

## October

- 1st—Faculty Meeting—3:30 p.m. NUCL 140A
- 8th—Colloquium—Carolyn Joseph—3:30 p.m. WTHR 172
- 13th—14th—Fall Break
- 25th—Homecoming

## November

- 5th—Faculty Meeting - 3:30 p.m. NUCL 140A
- 26th—27th—Thanksgiving Break

## December

- 4rd—Faculty Meeting - 3:30 p.m. NUCL 140A
- 21st—Graduation
- 25th—26th University Holiday