THE BEEET

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Tucson Section General Meeting:

AN INTRODUCTION TO FUSION ENERGY—THE FUNDAMENTAL PARAMETER SPACE OF CONTROLLED THERMONUCLEAR FUSION

Speaker: Dr. Irv Lindemuth, retired Los Alamos Nat'l Labs (This is a rescheduled meeting from last year)

LOCATION: University of Arizona, Room ECE 530
DATE: Thursday March 7, 6:00 pm

Refreshments Provided (pizza and soft drinks)

Under what conditions can useful fusion energy release occur? What are the practical limits on these conditions? What approaches to harnessing fusion are being pursued? Are two common perceptions correct: (1) fusion is very high cost; (2) fusion is 30 years away? Is there anything that could substantially lower the cost of fusion? Have any promising fusion stones been left unturned? We apply a few simple first-principles equations to identify the parameter space in which controlled fusion might be possible. Fundamental physical parameters such as minimum size, energy, and power as well as cost are estimated. By comparing loss rates with fusion rates, we can identify the density-temperature space where fusion gain can be achieved. This simple analysis offers a general understanding of the extreme differences between the two conventional approaches, inertial confinement fusion (ICF) as embodied in the National Ignition Facility (NIF) and magnetic confinement fusion (MCF) as embodied in ITER. The analysis shows that the constraint of steady-state operation forces MCF to operate at the low end of the density spectrum and the constraint of unmagnetized fuel forces ICF to operate at the high end. Most importantly, the analysis shows the implications of relaxing these constraints, mainly, that operation at an intermediate density with magnetized fuel has many attractive features and potentially overcomes some of fusion's obstacles, particularly cost. One approach to accessing the intermediate density regime is magnetized targets driven by various candidate drivers.

INSIDE THIS ISSUE

Pretty much lost in history is the fact that the first neutrons produced in the U.S. electron beam fusion program came from a magnetized target at Sandia National Laboratories. Unfortunately, SNL prematurely abandoned magnetized targets, a decision that may have contributed to the ultimate demise of the electron beam and light ion beam fusion programs. Recently, there has been renewed interest in magnetized targets at Sandia, Los Alamos, the Air Force Research Laboratory, the University of Rochester, and elsewhere. However, the chances that these efforts, and other promising approaches, can reach technical maturity are limited without a major cultural change in the U.S. fusion program's funding priorities.

BIOGRAPHY

Dr. Lindemuth retired from full-time employment in November, 2003 after more than 32 years with the University of California, first at the Lawrence Livermore National Laboratory and then at the Los Alamos National Laboratory. At Los Alamos at the time of his retirement, Dr. Lindemuth was a Special Assistant for Russian Collaboration in the Office of the Associate Director for Weapons Physics, the Team Leader for Magnetohydrodynamics and Pulsed Power in the Plasma Physics Group, and a Project Leader for Pulsed Power Science, Technology, and International Collaboration in the High Energy Density Hydrodynamics Program.

Message to the Tucson Section

By Joseph Wu

I'd like to invite everyone in the Tucson Section to participate in IEEE. In the last year, we've conducted activities for schools, the University of Arizona, and for you, the membership. These activities are a great way to get involved in IEEE and show the impact of engineers in our community.

We have a great core of volunteers but we could always use your help. I'm asking people to get involved. With more people the Tucson Section could do so much more for the membership and this community.

If you're interested in helping out or becoming an officer, contact us through the following website:

http://ewh.ieee.org/r6/tucson/

Become an IEEE Senior Member!

Do you want to become a senior member of the IEEE? The IEEE wants to promote qualified candidates to senior membership! If you have 10 years of professional experience of which five years of significant professional performance, you are qualified for a senior member upgrade. Educational experience such as a bachelor's degree in an IEEE-designated field counts 4 years to that number, a master's degree counts 5 years and a doctorate counts 6 years. In order to find out more, point your web browser to www.ieee.org and search for senior membership!

Senior Membership:

http://www.ieee.org/web/membership/senior-members/

Applications can be found online. You will need the references of three current senior members or fellows. If you need assistance, contact Joseph Wu at joewu@ieee.org.

Save the date....

Next Meeting – Sponsored by the Microwave Theory and Techniques Student Branch Chapter

"Characterization of Space Shuttle Ascent Debris Based on Radar Scattering and Ballistic Properties –Evolution of the NASA Debris Radar (NDR) System"

Speaker: Brian M. Kent Ph.D.,
IEEE Fellow, AMTA, AFRL

Chief Scientist, Sensors Directorate

Air Force Research Laboratory

Location: University of Arizona, ECE 530

Date: March 19, 2013

Time: 6PM

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Put the following in the body of the message:

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Other News

Upcoming Conferences

2013 Wireless Telecommunications Symposium (WTS 2013)
17 Apr - 19 Apr 2013
Ocotillo Golf Resort
Chandler, AZ, USA
www.csupomona.edu/wtsi

U of A Student Branches

In the Tucson Section, there are active student branches. The Student Branch Chapter of the MTT frequently brings in speakers from the distinguished lecturer series.

The U of A main student branch is also active. They have been running an open lab space in the ECE department, helping out various senior projects, and even putting together an Arduino workshop in their spare time. If you're interested in finding out what they do, or want to help out with a donation go to uaieee.com.

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We need to hear from you!

How can we make IEEE a better organization? We can only do it with your help. As a volunteer organization, IEEE depends on your participation to accomplish all of our goals.

As you can see from this newsletter, there are lots of activities where you can actively contribute. Are you good at organization? Volunteer to head one of our Chapters or to help organize our general meetings. Want to show off or improve your internet skills? Volunteer to help with our Web site. Interested in promoting our field to the next generation of engineers? Help with Engineers Week, or as a judge for any of our student competitions.

Even if you only have a little bit of time, there's sure to be an IEEE opportunity that will interest you. Even if you have no free time at all, but have ideas for meetings or activities that promote engineering and the IEEE, let us know! We'd like to hear from you. Please contact Joseph Wu at joewu@ieee.org.