DISTINGUISHED LECTURER SEMINAR* ANNOUNCEMENT

The Path to Magnetic Fusion Energy: Crossing the Next Frontier

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Director, DOE's Princeton Plasma Physics Laboratory (PPPL)

Date: **MONDAY, MAY 7, 2007**
Time: **12:00 noon to 1:30 p.m.**
Place: **Boelter Hall, Room 6764 (Edward K. Rice Room)**
(Lunch will be served at 11:30 a.m.)

Abstract:

Moving beyond ITER toward a compact magnetic fusion demonstration reactor (Demo) will require the integration of high plasma performance in steady-state with advanced methods for dissipating very high divertor heat-fluxes, while respecting strict limits on tritium retention. Expressing power exhaust requirements in terms of P_{heat}/R, future ARIES reactors are projected to operate with 60-200MW/m, Component Test Facilities (CTF) 40-50MW/m, and ITER 20-25MW/m. However, new and planned long-pulse experiments (such as EAST, JT60-SA, KSTAR, SST-1) are currently projected to operate at values of P_{heat}/R up to 16MW/m. Furthermore, none of them are planned to operate with a high-temperature first wall, critical for the study of tritium retention in fusion systems. The considerable gap between upcoming long-pulse experiments and a CTF or fusion power plant motivates the development of the concept for a new experiment – the National High-power advanced-Torus eXperiment (NHTX) – whose mission is to study the integration of high-confinement, high-beta, long-pulse fully-non-inductive plasma operation with a fusion-relevant high-power plasma-boundary interface. Systems code studies find an optimal aspect ratio $A \approx 1.8$ simultaneously maximizes the achievable P_{heat}/R and non-inductive I_P (bootstrap + neutral beam current drive). With this optimization, the NHTX can also significantly advance the Spherical Torus concept toward CTF and reactor applications. The PPPL site power and TFTR test cell and neutral beams are well suited to the NHTX mission. A highly flexible divertor coil set is a crucial design element which facilitates testing of many divertor geometries including an ITER-like divertor and a wide range of poloidal flux expansion = 3-30. TRANSP simulations of the beam-driven current, the role of other possible current-drive sources, and future engineering and physics analysis work will be discussed.

Biosketch:

Robert J. Goldston is a Professor of Astrophysical Sciences at Princeton University and an international leader in the fields of plasma physics and magnetic fusion energy. Since 1997, he has served as Director of the U.S. Department of Energy's Princeton Plasma Physics Laboratory (PPPL), a collaborative national center for plasma and fusion science.

Dr. Goldston has been a primary contributor to the physics design and experimental programs of the major fusion devices at PPPL since 1975.

Dr. Goldston is the author of 220 papers on experimental and theoretical plasma. In 1988, he was awarded the American Physical Society (APS) Prize for Excellence in Plasma Physics. Professor Goldston is a Fellow of the APS. In 1977, Dr. Goldston received a Ph.D. from Princeton University in Astrophysics, Program in Plasma Physics.

*For more seminar details, please contact Ms. Allyson Kwan at allyson@fusion.ucla.edu (310-**825-2389**)*

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