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Michigan Institute for Plasma Science and Engineering

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3:30 pm
Room 1005 EECS

Prof. Troy A. Carter

University of California-Los Angeles

Overview of Research Using the Basic Plasma Science Facility at UCLA

The Basic Plasma Science Facility at UCLA is a national user facility for studies of fundamental processes in magnetized plasmas. The centerpiece is the Large Plasma Device, a 20 m, magnetized linear plasma device. Two hot cathode plasma sources are available. A Barium Oxide coated cathode, produces plasmas with $n_e \sim 10^{12}$ cm^{-3}, $T_e \sim 5$ eV, $T_i \lesssim 1$ eV for 100 G <B< 2 kG. This low-β plasma has been used to study fundamental processes, including: dispersion and damping of kinetic and inertial Alfvén waves, flux ropes and magnetic reconnection, three-wave interactions and parametric instabilities of Alfvén waves, turbulence and transport, and interactions of energetic ions and electrons with plasma waves. A Lanthanum Hexaboride cathode, produces higher densities and temperatures: $n_e \lesssim 5\times10^{13}$ cm^{-3}, $T_e \sim 12$ eV, $T_i \sim 6$ eV at lower B. This higher density source enabled creation of laser-driven collisionless magnetized shocks, magnetized plasmas with β approaching or possibly exceeding unity. This opens up opportunities for investigating processes relevant to the solar wind and astrophysical plasmas. Potential studies include: dispersion and damping of kinetic Alfvén waves nonlinear interactions among Alfvén waves and Alfvénic turbulence, and mirror and firehose Instabilities.

About the Speaker: Troy Carter is Professor of Physics at UCLA, where he is Director of the Basic Plasma Science Facility. He received B.S. degrees in Physics and Nuclear Engineering from North Carolina State University in 1995 and was awarded his PhD in 2001 in Astrophysical Sciences from Princeton University. He was a co-winner of the 2002 APS John Dawson Award for Excellence in Plasma Physics Research for his studies of turbulence and its role in magnetic reconnection. His current research focuses on waves, instabilities, turbulence and transport in magnetized plasmas, making use of fundamental plasma devices such as LAPD as well as magnetic fusion experiments such as the DIII-D tokamak. He is a Fellow of the American Physical Society.