Michigan Institute for Plasma Science and Engineering Seminar

Plasma Based Acceleration: A Path Towards Compact Particle Accelerators

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Wednesday, 13 April 2011 - 4:00 pm
Room 1303 EECS Building

Abstract

In plasma-based acceleration the space charge or radiation pressure of an intense particle beam or laser pulse creates a plasma wave wake with a phase velocity near the speed of light. Charged particles then surf on this wake to ultra-high energies in short distances. There has been tremendous progress including the demonstration of mono-energetic electrons beams in excess of 1 GeV driven by lasers and the energy doubling of electrons from the SLAC beam from 42 to 84 GeV in less than one meter. Computer simulations have played an indispensible role in this development. Due to the nonlinear and kinetic nature of how a laser and particle beam interact with the plasma, the tool of choice has been particle-in-cell (PIC) simulations. With the advent of massively parallel computers and improved algorithms full-scale simulations in three-dimensions of experiments are now possible. In this talk, I will give a status of the field, describe how computer simulations are impacting progress in this field, and describe what can be expected in the next decade both experimentally and computationally.

About the Speaker: **Prof. Warren B. Mori received his BS from UC Berkeley in 1981, and his M.S. and Ph.D. from UCLA in 1984 and 1987. He has been on the faculty of the Physics and Astronomy, and the EE Departments at UCLA since 1989, becoming full professor in 1999. Since 2006 he has been the Director of the UCLA Institute for Digital Research and Education. Prof. Mori pioneered the use of PIC for modeling laser and wakefield accelerators, making seminal contributions to the acceleration of particles in nonlinear plasma waves, to plasma wave-laser interactions, and the generation tunable radiation. He and his group were the original developers of the codes OSIRIS and QuickPIC. He received the Int. Center for Theoretical Physics Medal and he is Fellow of the American Physical Society and IEEE. He is a co-author of over 250 articles including over 50 in PRL and 4 in Nature.**