

Joint ECE and Physics Seminar

Time and Location: Friday Aug. 30, 2013 at 4pm, Hammond Auditorium (Engr. 120)

Title: Probing and heating plasmas with short wavelength radiation

Speaker: Prof. Greg Tallents

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Abstract: The development of bright short wavelength (< 50 nm) sources of radiation has enabled new experiments where (1) plasmas created by infra-red or visible lasers are probed by short wavelengths and (2) high density plasmas are created from solid targets by short wavelength irradiation. Experimental results obtained at the LASERIX facility using an extreme ultra-violet (EUV) laser at 13.9 nm probing plasma produced by a 35 fs, 3×10^{16} Wcm⁻² infra-red laser incident onto solid targets are presented to illustrate the diagnostic potential of EUV probing. Ionization of a buried layer of iron in an otherwise plastic target causes the iron to become transparent and hence act as a signature of heat transport in the target. These experiments enable verification of heat transport modelling, important in inertial fusion and other applications of laser-plasmas. Other work reports 2D fluid code simulations of 46.9 nm laser irradiation of solid targets, showing a capability for ablating large depths of solid material. To support the simulation studies, models of laser interaction relevant to both x-ray free electron laser (XFEL) and laboratory EUV laser interactions with solids have been developed in order to explore, for example, the regimes where fully detailed time dependent populations need to be calculated and where equilibrium (LTE) models of quantum state populations are valid.

Short biography: Greg Tallents is a Professor in the York Plasma Institute (YPI), University of York. The YPI was established with two new buildings for offices and laboratories and some new staff in 2011 with an aim to research plasma physics relevant to magnetic and inertial fusion and also plasmas of technological importance. In the YPI there are twelve academic staff, approximately 10 post-doctoral researchers and 40 post-graduate student researchers. Greg heads the laser-plasma group comprising five academic staff. He is presently directly supervising a post-doctoral researcher and three graduate students. He undertook a PhD at the Australian National University in laser-plasmas and has worked in laser-plasma and x-ray laser research for 'several' decades in Australia and the U.K. He teaches atomic physics courses to undergraduate students and a course on plasma diagnostics to masters and PhD students at the University of York.

Hosts: Prof. Jorge Rocca <rocca@engr.colostate.edu> and Prof. Carmen Menoni <menoni@engr.colostate.edu>.