



John Adams Institute for Accelerator Science Lecture Series

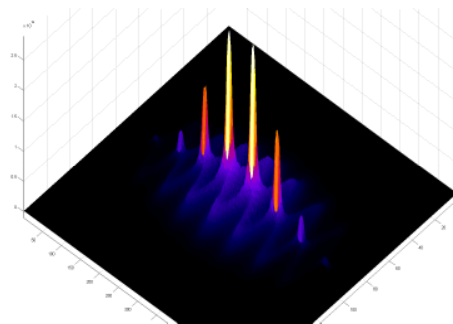
Thursday 30th May 2013 at 2:30pm
Fisher Room, Denys Wilkinson Building

Micro-Bunching Conventional Particle Beams to Drive Plasma Wakefield Acceleration

The lecture will be delivered by

**James A. Holloway,
University College London**

Abstract: Plasmas can support electric fields thousands of times greater than those achievable in conventional radio frequency accelerators. Plasma wakefield acceleration uses these longitudinal electric fields to accelerate charged particles to high energies over short distances. A short duration laser or particle beam is needed to drive such a wakefield in plasma. The bunch duration for a driving beam is, however, significantly shorter than those of existing typical accelerators. An experiment using plasma wakefields to modulate the 2.6cm long electron beam (from the Diamond Light Source facility in Oxfordshire) into distinct micro-bunches of the required duration is proposed. We will show through numerical simulations that, once treated, the micro-bunched electron beam is a very effective wakefield accelerator driver with expected accelerating gradients $> \text{GVm}^{-1}$. The use of such a micro-bunched beam to induce a wakefield in a subsequent plasma column could lead to a next generation synchrotron light source or ultimately be the route to a TeV-scale $e^+ e^-$ collider of a few km in length.



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