



John Adams Institute for Accelerator Science Lecture Series

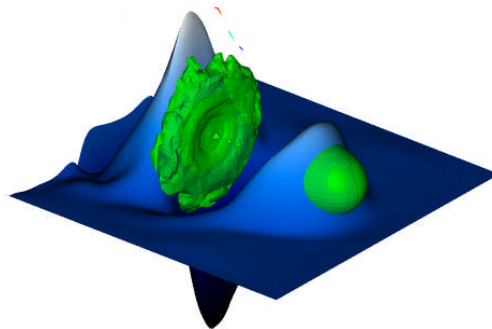
Thursday 26th September 2013 at 2:30pm
Fisher Room, Denys Wilkinson Building

Towards Hybrid Plasma-based Multi-color FELs

The lecture will be delivered by

Bernhard Hidding,
University of Strathclyde, University of Hamburg/DESY, UCLA

Abstract: The first accelerator experiments of Rutherford et al. helped discover electrons and ions as the atom's building blocks. Not even 50 years later at CERN, these very building blocks in turn were suggested to be the basis of novel collective accelerators. Such *plasma* accelerators were developed relatively disjunct from the mainstream accelerator R&D for a long time, until since recently they increasingly re-coalesce. Hybrid beam-driven plasma wakefield accelerators (PWFA) can provide dephasing-free, ~ 100 GV/m scale accelerating fields over meter-scale distances. However, the electron beam quality and stability hitherto obtainable by such systems strongly limits their practicability. I will report on the development of the fundamentally novel underdense photocathode (aka Trojan Horse) plasma wakefield mechanism, which promises for the first time production of electron bunches not with all worse, but in turn with much better key beam quality parameters than state-of-the-art accelerators. For example, normalized emittance values down to 10^{-10} m rad and electron beam brightness up to 10^{19} A m⁻² rad⁻² may be feasible. In combination with at the same time substantially enhanced flexibility and tunability, such electron (multi-)bunches may be highly promising candidates for advanced light sources such as free-electron-lasers.



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