

Cockcroft Institute Seminar

Dr Nicholas Matlis
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Tuesday, 3 March 2015, at 14.00
Venue: Merrison Lecture Theatre

Title: Micromanaging laser-plasma interactions for fast accelerator science"

Abstract:

Laser plasma accelerators (LPAs) hold great promise as ultra-compact electron sources because of their high acceleration gradients ($\sim\text{GeV/cm}$) and flexible format, but have yet to gain wide-spread acceptance due to limitations in their tunability and stability. These limitations, caused by the fluid nature of the accelerator formation, have required the development of sophisticated new techniques tailored to manage the microscopic dynamics of the laser-plasma interaction. This talk will highlight recent work aimed at addressing the unique control challenges of this accelerator format, including the use of multiple-pulse collisions to trigger electron injection, the use of tomography to see through walls, the use of spectroscopic imaging to track gas-plume and laser evolution and the use of chirped-pulse interferometry to resolve wake-induced Raman shifts. These methods provide a tremendous wealth of in-situ, shot-by-shot information from within the accelerator, enabling control of and shining new light on what has previously been a black box accessible primarily by simulation.

Refreshments will be available