

Cockcroft Institute Seminar

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Thursday, 22 January 2015, at 15:00

Venue: Walton Rooms A & B

Title: A new type of Optical Transition Radiation beam size diagnostics with sub-micrometer resolution

Abstract

Optical Transition Radiation (OTR) is widely used to diagnose beam size, emittance, position and energy spread. Despite of the fact that this is an invasive method, i.e. a solid target have to be put on an electron beam, it enables to observe a 2D particle beam profile in a single shot. The resolution of conventional OTR monitor is limited by a diminution of so-called OTR Point Spread Function, which is an initial source generated by a single electron on a target surface and projected by an optical system on a detector. The dimension of an OTR PSF is several microns, so is the limitation of the resolution. However, the OTR PSF is non-uniform. In fact one polarisation component is a two lobe distribution. We have learned how to use the OTR PSF to extract the beam size using the visibility degradation of the OTR PSF. At KEK ATF2 extraction line we have developed a new monitor and measured the beam size as small as 0.75 microns. The next phase of our studies is to optimise the optical system using ZEMAX code and minimise the OTR PSF to achieve even higher resolution and measure a beam smaller than 100 nm.

Refreshments will be available