Contribution ID: **54** Type: **Poster (including Speed Talk)**

Femtosecond Radiative Longitudinal Diagnostic Techniques Employed at ARES

Thursday 26 June 2025 10:44 (3 minutes)

Femtosecond and sub-femtosecond longitudinal diagnostics are required to accurately characterise the short bunches required by novel acceleration techniques. For femto-second bunch lengths, the coherence of transition radiation starts to reach the near-infrared to optical regime, where the spectrum can be easily detected, rendering information on the form factor and bunch length. The ARES (Accelerator Research Experiment at SINBAD) linear accelerator is well suited to the employment of this diagnostic technique for the characterisation of short bunches.

The Smith-Purcell radiation mechanism has been extensively studied from metallic gratings, however not much experimental data has been published with respect to dielectric gratings as charged particle beam diagnostic devices. Detection of the radiation at the substrate side is expected to be advantageous and the spectral properties of the radiation can be tailored by careful design of the grating structure geometry. Dielectric gratings can be produced with optical wavelength periodicities and the shapes can be controlled with nano-meter precision, showing potential for femtosecond longitudinal diagnostic applications.

Summary

Primary author: STACEY, Blae (MIL (Injektoren und Linearbeschleuniger))

Co-authors: VINATIER, Thomas (MPY1 (MPY Fachgruppe 1)); KUROPKA, Willi (MIL (Injektoren und Linearbeschleuniger)); HILLERT, Wolfgang (UNI/EXP (Uni Hamburg, Institut fur Experimentalphysik))

Presenter: STACEY, Blae (MIL (Injektoren und Linearbeschleuniger))

Session Classification: Beam Diagnostics

Track Classification: Beam diagnostics