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Wakefield-Based Diagnostics for High-Brightness Beams: From FELs to Plasma Accelerators

Friday 26 September 2025 09:30 (30 minutes)

High-resolution temporal diagnostics are essential for the development and optimization of next-generation high-brightness accelerators. This talk presents recent advances in wakefield-based diagnostics which enable single-shot, femtosecond-resolved measurements of ultra-short electron bunches. These diagnostics, based on the time-dependent transverse kick induced by beam-driven wakefields in dielectric or corrugated structures, have been successfully demonstrated at X-ray free-electron lasers (XFELs) as compact, cost-effective tools for beam and photon diagnostics. We will highlight their current use at SwissFEL, design and implementation strategies, and discuss ongoing efforts to adapt and deploy them in plasma-based accelerators, where robustness, synchronization, and compactness are essential.

Author: Dr CRAIEVICH, Paolo (Paul Scherrer Institut)

Presenter: Dr CRAIEVICH, Paolo (Paul Scherrer Institut)

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