MATTER AND TECHNOLOGIES

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Wakefield-based bunch duration diagnostics with dielectric capillaries at ARES for the TWAC project

Wednesday 18 September 2024 17:30 (3 minutes)

The EIC-Pathfinder project TWAC (Terahertz Wave Accelerating Cavity) aims to build a prototype accelerator demonstrating the feasibility of a compact machine based on THz-driven accelerating structures for the purpose of research, medical and industrial applications. The prototype should deliver low-energy, ultrashort and high peak current electron bunches (~10 MeV, femtosecond scale and ~1 kA) on a small footprint. Within the framework of the TWAC project, DESY is in charge of developing and experimentally testing compact advanced bunch duration diagnostics for the prototype. The retained option is a diagnostics based on streaking of the bunch by the self-induced transverse wakefields when passing through a dielectric-loaded cylindrical waveguide (the so-called passive streaking). To study the performance of this diagnostic, a proof-of-principle experiment has been carried out on the ARES linear electron accelerator at DESY, whose versatility allowed setting up several working points to approach iteratively the beam parameters expected in TWAC, which are far from the current range of applicability of passive streaking. In addition, ARES offers a benchmark possibility through a comparison with an X-band transverse deflecting structure (PolariX-TDS). In this contribution, we present the experimental setup installed at ARES, the development of a current profile reconstruction algorithm from the experimental data as well as the first passive streaking results at ARES and their comparison with PolariX-TDS measurements.

Speed talk:

Normal speed talk selection

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