Contribution ID: **2413** Contribution code: **SUPM041** Type: **Student Poster Presentation**

Advanced beam tuning and beam measurements techniques in the CLEAR facility

Sunday 1 June 2025 14:00 (2 hours)

The CLEAR (CERN Linear Electron Accelerator for Research) facility delivers to a wide user community a 200 MeV electron beam with highly flexible parameters.
Running conditions range from single-bunch to multi-bunch operation, with bunch charges from 10 pC to 1 nC, bunch durations from 100 fs to tens of ps, and
includes tunable momentum (30 MeV/c to 220 MeV/c).
Such a variety of beam conditions poses a challenge to the beam instrumentation and to the beam measurements and tuning techniques, even more so given that quite often a rapid switch from one set of conditions to a very different one is required.
In this paper we present several examples of the techniques developed in CLEAR for this purpose and discuss their advantages and limitations.
Examples include emittance measurements and phase space reconstruction procedures by quadrupole scans and beam based alignment methods.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

Funding Agency

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Session Classification: Student Poster

Track Classification: MC2: Photon Sources and Electron Accelerators: MC2.A08 Linear Accelerators