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First prototype measurements with an electro-optical bunch profile monitor for FCC-ee

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The future circular electron-positron collider (FCC-ee) is designed for highest luminosity to enhance the precision of high-energy particle physics experiments, spanning energies from the Z pole to the $t\bar{t}$ threshold. As outlined in its conceptual design report, high-precision measurements of the longitudinal bunch profile are required across multiple operation modes, which presents key challenges for beam instrumentation. As part of the feasibility study, a concept for an electro-optical (EO) bunch profile monitor has been developed to address these challenges, building on the existing EO beam diagnostic at the Karlsruhe Research Accelerator (KARA) at KIT. The first EO monitor prototype for FCC-ee features a novel crystal-holder design using prisms, enabling a single-pass setup crucial for measuring the long bunches during Z operation.

This contribution presents the first measurement results of the EO monitor prototype for FCC-ee, which were obtained in the in-air test stand at the CERN Linear Electron Accelerator for Research (CLEAR).

Summary

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