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## Analysis of a phase modulated interferometric Electro-Optic BPM at the CERN SPS

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The Electro-Optic Beam Position Monitor (EO-BPM) is a new diagnostic tool being developed to enhance the intra-bunch transverse beam position monitoring in the High Luminosity LHC at CERN. This EO-BPM has been installed in the Super Proton Synchrotron (SPS) since 2024. The Pockels effect in lithium niobate crystals is exploited to detect the propagating electric field from passing proton bunches, enabling measurement of beam position and intra-bunch instabilities. Light is conveyed from a remote laser via optical fibres to a Mach-Zehnder interferometer formed between two waveguide pick-ups. The rapid response of the EO-BPM enables intra-bunch turn-by-turn measurements. Data recorded over a range of beam conditions have been studied to characterise its performance, stability, and sensitivity. This paper presents the latest data collected from the SPS and discusses the analysis and future development of the EO-BPM.

### Footnotes

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