A 36: Poster – Correlation Phenomena

Time: Thursday 17:00–19:00 Location: Tent

A 36.1 Thu 17:00 Tent

Deep learning-based delay-line detector evaluation for ultrashort electron correlation measurements — •Tobias Volk[1], Marco Knipfer[1], Stefan Meier[1], Jonas Heimerl[1], Sergei Gleyzer[2], and Peter Hommelhoff[1,3] — [1]Department Physik, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), 91058 Erlangen — [2]Department of Physics and Astronomy, University of Alabama, Tuscaloosa, AL 35487, USA — [3]Department Physik, Ludwig-Maximilians-Universität München (LMU), 80799 München

The precise reconstruction of electron events using delay-line detectors is a challenging task, especially if multiple electrons arrive closely confined in space and time. Recently, deep learning-based reconstruction approaches have been shown to significantly outperform classical algorithms, reducing the dead radius by a factor of 8 while improving overall resolution [1]. Nevertheless, in this approach, precision as well as evaluation speed was still limited by the necessity to include classical algorithms into the reconstruction pipeline. Here we present an improved evaluation method that overcomes this limitation by enabling direct reconstruction of the electron's spatiotemporal positions from the analog input signals. We achieve further enhancements in the reconstruction accuracy and show initial steps towards live data processing. We showcase that our deep learning approach sets the stage for simultaneous investigation of temporal and spatial electron correlations for ultrafast emitted two-electron events, as well as number statistics measurements.

[1] Marco Knipfer et al., Mach. Learn.: Sci. Technol. 5 (2024)