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Deep Learning-Based Autoencoder for Data-Driven Modeling of the European XFEL Photoinjector

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We present data-driving modeling of the European XFEL photoinjector using a deep learning-based autoencoder. We show that the autoencoder trained only with experimental data can make high-fidelity predictions of megapixel images for the longitudinal phase-space measurement. We also discuss the practical challenges of building such an intelligent system for operation and propose a pragmatic way to model a photoinjector with various diagnostics and working points. The approach can possibly be extended to the whole accelerator and even other types of scientific facilities.

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Session Classification: Virtual Diagnostic