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Advanced controls and Machine Learning at FLASHForward

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Plasma-based accelerators hold the potential to achieve mulit-giga-volt-per-metre accelerating gradients, offering a promising route to more compact and cost-effective accelerators for future light sources and colliders. However, plasma wakefield acceleration (PWFA) is often a nonlinear, high-dimensional process that is sensitive to jitters in multiple input parameters, making the setup, operation and diagnosis of a PWFA stage a challenging task. To tackle some of these issues, Machine Learning techniques have gained popularity in the field of plasma acceleration. This talk provides a brief overview of how Machine Learning methods are being applied at FLASHForward, a beam-driven plasma wakefield accelerator test-bed based at DESY, Hamburg, with emphasis on those related to deep learning.

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