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Status of Beam-Based Feedback Research and Development for the Linear Accelerator ELBE

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The superconducting linear accelerator ELBE at Helmholtz-Zentrum Dresden-Rossendorf is a versatile light source operated in a continuous wave (CW) mode. The CW allows flexible electron bunch repetition rates and high average current, thus enabling experiments that would otherwise be impossible to perform, hence the versatility.

Time resolved pump-probe experiments place higher demands on the beam stability. To address this requirement the existing digital LLRF control is complemented by a beam-based feedback scheme. In particular, the new scheme includes a bunch arrival time monitor and a beam-based feedback regulator. The latter is designed to reduce the bunch arrival time jitter.

In this contribution we give an overview of the new control scheme. Specifically, we present the main points of the design and implementation of the beam-based feedback regulator. Finally, we show the results of a recent ELBE machine study that demonstrated a reduction of the bunch arrival time jitter.

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