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Jitter tolerance for the FEBE beamline on CLARA

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CLARA at STFC Daresbury Laboratory is a test facility for FEL research and novel accelerator technologies, providing high-quality electron bunches with charges up to 250 pC. Phase two of CLARA, which will bring the accelerator to its design energy (250 MeV) and repetition rate (100 Hz), is expected to begin commissioning in 2024. To maximise exploitation of the upgraded accelerator, a dedicated Full Energy Beam Exploitation (FEBE) beamline is currently being installed, featuring two large chambers where a high-power laser and advanced diagnostics will be available for user experiments that include investigation of novel plasma acceleration methods. Many experiments planned for CLARA-FEBE will require a high level of shot-to-shot beam stability, placing particular importance on the bunch time of arrival (tens of femtoseconds) and peak current (several kiloamperes). Accurate modelling of beam jitter will therefore be critical for the purposes of planning user experiments, and for future work to mitigate the dominant jitter sources in the machine. In this contribution, we investigate the jitter tolerance of CLARA-FEBE using start-to-end simulations of the accelerator complex.

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Footnotes

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Yes

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