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An update of progress on the design of the diffraction line for the relativistic ultrafast electron diffraction and imaging facility at Daresbury Laboratory

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The Relativistic Ultrafast Electron Diffraction and Imaging (RUEDI) facility is an approved project to provide ultrafast capability to UK researchers. The current design involves two separate beamlines for diffraction and imaging but with shared infrastructure including laser pump sources. This presentation describes recent progress in the design of the diffraction line.

The diffraction line has a 2.4 cell S-band RF gun to produce 4 MeV electron bunches. Bunch compression to the sub-10 fs range is carried out with a triple bend achromat design that also suppresses arrival time jitter*. Interchangeable sample chambers are planned to allow wide ranging experiments from both solid samples at room and cryogenic temperatures and liquid and gas targets. Post sample optics are provided to image the diffraction pattern on to a high-resolution single electron sensitive detector. Temporal diagnostics including an RF TDC and THz deflector are included along with a spectrometer at the end of this line to measure beam energy.

Footnotes

- J.W. McKenzie, et al, 'Status of the RUEDI UK national facility design' Proceedings of the International Particle Accelerator Conference 2024 (IPAC-24), WEPC17, 2024, Nashville, USA.

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