Contribution ID: **2358** Contribution code: **SUPS023** Type: **Student Poster Presentation**

Simultaneous electron beam acceleration and compression with a radiofrequency cavity in ultrafast electron diffraction experiments

Sunday 1 June 2025 14:00 (2 hours)

In ultrafast electron diffraction experiments, the scattering cross-section, q-range, and space-charge effects are critically influenced by the electron beam energy, which is constrained by the high-voltage breakdown. By integrating a 100 kV DC electron gun with a 3 GHz radiofrequency cavity powered with a 400 W amplifier, we demonstrate a net energy gain of up to 31 keV. Here we present simulation and experimental results highlighting the simultaneous compression and accelerating capabilities using a radiofrequency cavity, demonstrating that significant energy gains are attainable without compromising femtosecond scale time resolution.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

Funding Agency

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Session Classification: Student Poster

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D09 Emittance manipulation, Bunch Compression and Cooling