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Research plans for the University of Hawai'i Accelerator and Free-Electron Laser Lab

Monday 2 June 2025 16:00 (2 hours)

The accelerator and free-electron laser (FEL) laboratory at the University of Hawai'i at Manoa (UHM), established by John Madey, has been in standby since his passing in 2016, with operations further paused during the pandemic. Recent efforts aim to recommission the facility, which includes a thermionic gun, an S-band linear accelerator reaching 45 MeV, and a Mark III undulator FEL oscillator producing tunable infrared light. Previously, 3 μm infrared light from this undulator demonstrated the capability to generate 10 keV X-ray photons via inverse Compton scattering. Current upgrades include enhancements to vacuum systems and linac controls.
Future plans focus on enhancing cathode performance, developing 3D FEL simulations for superradiance studies, achieving phase coherence with interferometer optics, and using waveguides for THz generation. Recent GINGER simulations explored FEL oscillator output under varying Desynchronization conditions, demonstrating pulse train formation. The revived UHM accelerator will advance FEL science and train the next generation of researchers.

Footnotes

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