Abstract Submitted
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Photon Source Capabilities of the Jefferson Lab THz to VUV FEL[1] G.P. WILLIAMS, S.V. BENSON, D. DOUGLAS, P. EVTUSHENKO, F.E. HANNON, C. HERNANDEZ-GARCIA, J.M. KLOPF, R.A. LEGG, G.R. NEIL, M.D. SHINN, C.D. TENNANT, S. ZHANG, Jefferson Lab — Jefferson Lab operates a sub-picosecond photon science R&D facility with peak and average brightness values that are many orders of magnitude higher than storage rings in the THz - VUV range. It also has multiphoton capabilities that provide unique opportunities for out of equilibrium dynamical studies at time-scales down to ~ 100 fs FWHM. The facility is based on a superconducting energy recovered linac which is operated with CW RF that powers oscillator-based IR and UV Free Electron Lasers (FELs) with diffraction limited sub-picosecond pulses with $> 10^{13}$ photons per pulse (1.0% BW) at pulse repetition frequencies up to 75 MHz. Details of the facility and its present performance will be presented along with some example science applications. In addition we will discuss on-going upgrades to the facility that will allow 10 eV lasing in the fundamental. Finally we will present two potential upgrades including the design of an oscillator-based VUV-FEL that would produce 6×10^{12} coherent (0.5% BW) 100 eV photons per pulse at multi-MHz repetition rates in the fundamental, and a dual FEL configuration that would allow simultaneous lasing at THz and UV wavelengths.

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G.P. Williams
Jefferson Lab

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