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MeV electron acceleration at 1 kHz with <10 mJ laser pulses[1] FATHOLAH SALEHI, ANDY GOERS, GEORGE HINE, LINUS FEDER, DONGHOON KUK, BO MIAO, DANIEL WOODBURY, KI-YONG KIM, HOWARD MILCHBERG, Univ of Maryland-College Park — We demonstrate laser driven acceleration of electrons to MeV-scale energies at 1kHz repetition rate using <10mJ pulses focused on near-critical density He and H_2 gas jets. Using the H_2 gas jet, electron acceleration to ˜0.5MeV in ˜10fC bunches was observed with laser pulse energy as low as 1.3mJ. Increasing the pulse energy to 10mJ, we measure ˜1pC charge bunches with >1MeV energy for both He and H_2 gas jets. Such a high repetition rate, high flux ultrafast source has immediate application to time resolved probing of matter for scientific, medical, or security applications, either using the electrons directly or using a high-Z foil converter to generate ultrafast .γ-rays.

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