

Experiments with the CLIO infrared FEL

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The infrared free-electron laser offers the advantage of a potential large tunability since the FEL gain itself remains substantially high throughout the infrared spectral range, and the reflectivity of metal mirrors used in the optical cavity remains also close to unity. The main limitation comes from the diffraction of the optical beam due to the finite size of the vacuum chamber of the undulator and other optical cavity elements. At CLIO, we have obtained an FEL tunable from 3 to 120 μm by operating the accelerator between 50 and 14 MeV and we plan to extend further this spectral range. Various type of experiments are taking place at the CLIO FEL facility. We discuss, in particular, the infrared near-field experiments that have been undertaken. We emphasize the spectroscopic near-field measurements and discuss some limitations that may appear in practice and theoretically. We present also preliminary measurements obtained with photoacoustic methods aimed at increasing the signal over noise ratio obtained with small objects.