

# Single Electron Accelerator for Dark Matter Search

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We present here a concept of a laser-driven accelerator for single electrons, designed to generate a beam of relativistic electrons for indirect search of dark sector particles.

The beam dynamics is verified by tracking them along the structure using DLATRACK6D. The optimization process, including determining the transverse periodicity lengths, electric field magnitude at the structure's center, and the number of micro-cells per macro-cell, is performed using a genetic algorithm. We propose integrating the accelerating structure into a mm-scale laser oscillator, which could facilitate extremely high repetition rates and enhances the accelerator's energy efficiency. We present the initial simulation of an intra-cavity accelerator, where a small structure with a few periods is placed inside the cavity. The simulation utilizes CST Studio Suite to calculate the structure impedance and its impact on the cavity.

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