



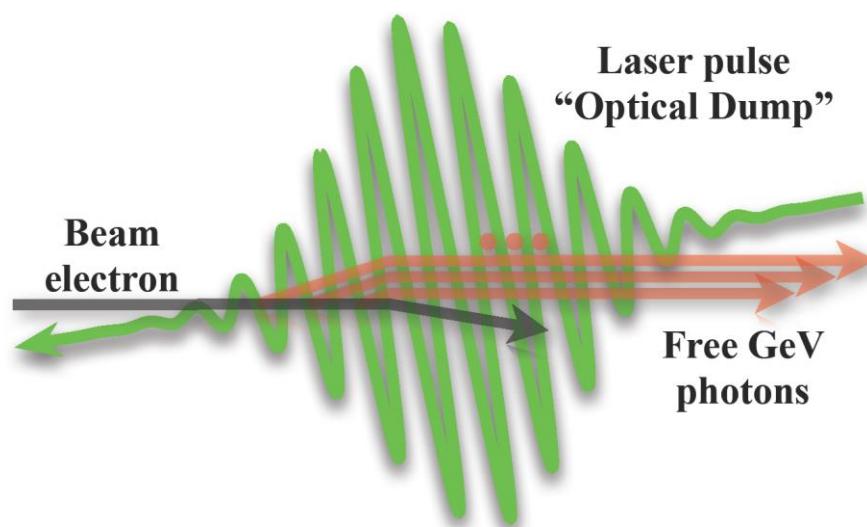
LUXE-NPOD: new physics searches with an optical dump at LUXE.

Tuesday, 22 March, 2022

Webcast 16:00 h

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We explore a novel method to search for feebly interacting massive particles in collisions between high energy electrons and intense laser pulses. We argue that these systems (of electron laser) can efficiently convert UV electrons to a large flux of hard, co-linear photons. We further propose to direct this unique large and hard flux of photons onto a physical dump which in turn is capable of producing feebly interacting massive particles, in a region of parameters that has never been probed before. We denote this novel apparatus as “optical dump” or NPOD (new physics search with optical dump). The proposed LUXE experiment at Eu.XFEL has all the required basic ingredients of the above experimental concept. We discuss how this concept can be realized in practice by adding a detector after the last physical dump of the experiment to reconstruct the two-photon decay product of a new spin-0 particle. We show that even with a relatively short dump, the search can still be background free. Remarkably, even with a 40 TW laser, which corresponds to the initial run, and definitely with a 350 TW laser, of the main run with one year of data taking, LUXE-NPOD will be able to probe uncharted territory of both models of pseudo-scalar and scalar fields, and in particular probe natural regions of scalar theories for masses above 100 MeV. In addition, we explore the reach of the current and past experiment to probe this class of new physics models.



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