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Numerical studies of electron beam dynamics for the generation of attosecond pulses at the European XFEL

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Generation of attosecond XFEL pulses has drawn great attention in a wide range of research fields over the past decade. Adaptation and combination of state-of-the-art FEL techniques have led to advanced working schemes capable of producing the required ultra-short X-ray pulses. At the European XFEL, an R&D project, the AttoSecond Pulses with eSASE and Chirp-Taper schemes (ASPECT), has been launched. A typical scheme employs an external laser to modulate an electron beam and enables efficient lasing only over a short part of the electron bunch. In this paper, numerical simulations are presented, without using an external laser, to explore the capabilities of generating attosecond pulses at the EuXFEL. Obtained results will be shown and relevant discussions are given.

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