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Is Attosecond Pulse Generation Achievable at ELI Beamline Facilities through the Flying Mirror Mechanism?

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The allure of attosecond pulses, which unravel electron behavior in atoms and find diverse applications across ultrafast phenomena, nuclear physics, and astrophysics, have captivated scientists in this field. The present investigation delves into the feasibility of generating attosecond pulses utilizing the Flying Mirror Mechanism at ELI Beamline Facilities. Achieving optimal reflection from the flying mirror necessitates a laser system of high energy and short duration coupled with sufficient plasma density. This study analyzed four ELI lasers, considering stable mirror conditions within the bubble regime and reflection coefficients. Our findings highlight the L1 ALLEGRA laser as exceptionally promising for generating attosecond pulses via the flying mirror mechanism in modern laboratories. By aligning parameters within the bubble regime using the L1 ALLEGRA laser, a stable mirror configuration was achievable, facilitating attosecond pulse generation upon reflection. Osiris simulation results demonstrate precise alignment of maximum reflectivity along the mirror central axis. The resulting attosecond pulse, lasting in order of 100 attoseconds, falls within the extreme ultraviolet (XUV) range, underscoring the potential for attosecond pulse generation in modern laboratories and its applications.

Available for oral presentation in a session

No

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