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Feasibility verification of ultrafast FEL generation experimental scheme based on SXFEL

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The photon energy in the soft X-ray range corresponds to the fundamental absorption edges of matter. Ultrashort X-ray pulses can be used to observe the breaking of chemical bonds in biochemical reactions and capture the transfer process of electrons in ultrafast physical phenomena, which is of great significance for the research of the next generation of semiconductor materials, such as diamond and graphene. In this paper, the feasibility of ESASE experiments on Shanghai Soft X-ray Free Electron Laser Facility (SXFEL) is theoretically verified. The results show that the ESASE scheme can produce ultrafast light pulses on the order of attosecond, with a peak power of 450 MW. At the same time, the simulation results in this paper verify the feasibility of chirped enhanced SASE schenme based on SXFEL. The results show that compared with the ESASE scheme, the power of the radiation pulse can be greatly improved by this scheme. A relatively low energy electron beam (1.5 GeV) was used to generate about 40 GW of radiation, and the length of the radiation pulse was significantly shortened.

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Footnotes

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Yes

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