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Research and application of chromatic effect in laser-driven proton therapy

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CLAPA-II, a novel proton therapy accelerator under development at Peking University and supported by the Ministry of Science and Technology of China, utilizes chromatic aberration and dispersion effects for energy selection of the laser proton beam driven by the radiation pressure acceleration (RPA). Through comprehensive research of the energy selection system using TraceWin, CLAPA-II can achieve a 3 MeV energy spread in proton beam transport. Take a deep research and prospect of chromatic effect in laser-driven proton therapy, enabling the transmission of a 6 MeV spread proton beam and enhancing beam transmission efficiency by 6.8 times based on the CLAPA-II design with a 3.8-meter beamline. Moreover, a corresponding treatment plan for beam delivery is provided, utilizing a 30-120 MeV proton beam for the treatment of head and neck tumors, with a single treatment time controlled within 20 minutes. Additionally, a lightweight gantry scheme is proposed to enhance its applicability in commercial settings for FLASH.

Footnotes

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Paper preparation format

Region represented

Asia

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