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Directional Control of Ablation Plasma in a Laser Ion Source Using a Permanent Magnet

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In laser ion sources, it has been shown that the maximum ion charge state increases as the laser irradiation angle relative to the target surface approaches normal incidence. However, in practical systems, a plasma transport line for extracting ion beams is typically aligned along the vertical axis of the target, making it difficult to irradiate the target at normal incidence. To solve this issue, we propose a method that controls the directionality of the ablation plasma using a magnetic field, enabling the vertical laser irradiation of the target. Since plasma density decreases with distance from the laser target, we installed a ring-shaped permanent magnet close to the target, slightly offset from the vertical axis, to deflect the plasma while maintaining high density. As a result, plasma deflection caused by the installed magnet was successfully observed. In this presentation, we discuss how the plasma deflection varies with magnetic field conditions.

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