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Development of a LWFA target for fine electron injection control

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Laser-wakefield acceleration (LWFA) is a research field that explores the production of high-quality particle beams by leveraging the interaction between intense laser pulses and plasma. LWFA holds promise for applications such as X-ray generation, where electron beams with high charge, tunable energy, low energy spread, and minimal emittance are essential. Achieving these beam characteristics depends on controlling laser and plasma parameters, particularly the electron plasma density profile. Sharp plasma density gradients have proven effective in generating high-quality beams by promoting localized electron injection with minimal phase variation. This project aims to advance LWFA by developing a novel gas target that precisely manipulates the density profile using a two-chambers design.

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