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Project Title.

Fabrication and Diagnostics of Fuel Targets for Laser-driven Inertial Confinement Fusion

Abstract.

This research aims to improve laser-based nuclear fusion by developing better ways to create and inspect the tiny fuel targets used in experiments, supporting the U.S. Department of Energy's efforts to advance clean fusion energy. Turning fusion into a practical source of unlimited clean power still faces big hurdles. One key issue is reliably making the precise fuel targets and checking the frozen fuel layer inside them at extremely cold temperatures before the laser shot. To tackle this, the project proposes using two cutting-edge tools: a high-precision 3D printing method called two-photon polymerization to build better targets, and an advanced imaging technique called cryogenic coherent anti-Stokes Raman scattering to create detailed 3D views of the targets and fuel under those freezing conditions.