

Abstract for a General Audience

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(Dated: August 18, 2015)

This project studied cryogenic hydrogen jets — extremely cold, thin jets of liquid hydrogen that freeze as they are shot into a vacuum. We studied the response of these jets to extremely short, intense bursts of laser light. In reaction to the laser pulse, the hydrogen atoms disassociate into protons and electrons. This produces a beam of protons that has applications as a compact, high quality proton source for radiation cancer therapy. Additionally, studying the response of the hydrogen jet itself helps us understand the process of inertial confinement fusion, a promising area of fusion research. My research used x-ray diffraction to probe the structure of the hydrogen jet before it gets hit by the pump laser. Understanding the structure of the cold jet helps us determine how the jet evolves as it absorbs energy.

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