

PHYSICS AND ASTRONOMY COLLOQUIUM

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Development and applications of a tabletop all-laser-driven x-ray light source

I discuss the development and applications of a novel table-top laser-accelerator-based x-ray source. A high power (100 terawatts) laser system accelerates electrons to high energy (0.5 GeV) and generates hard x-rays through the mechanism of inverse Compton scattering. The x-rays are demonstrated to have narrow-bandwidth (25%), wide tunability range (50 keV to 20 MeV), high collimation (5 mrad), and ultrashort pulse duration (femtosecond). These characteristics make this source advantageous for important research and societal applications, including radiography (with high resolution and low dose), diffractive imaging, ultrafast x-ray science, and selective nuclear activation analysis. Also to be discussed are current experiments on scattering at the highest light intensities ever studied in the laboratory.



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