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Characterization of Hard X-ray Radiation Produced From Gas Targets During Laser-Plasma Interactions With an Ultra-intense, Terawatt Class Laser System ZHEN ZHAO, WILLIAM SCHUMAKER, KEEGAN BEHM, MICHAEL VARGAS, VLADIMIR CHVYKOV, VICTOR YANOVSKY, ANATOLY MAKSIMCHUK, ALEXANDER THOMAS, KARL KRUSHELNICK, University of Michigan — X-rays produced via the interaction of an ultra-short, ultra-intense laser pulse with gas targets exhibit many desirable qualities such as compact sizes, short pulse durations, and short-pulse probe capabilities. These features make the use of such x-rays promising for applications ranging from medicine to homeland security. Using HERCULES, a 300 TW, 800 nm Ti:Sapphire laser system, the properties of hard x-rays produced via the interaction of a $\sim$ 30 fs laser pulse with various gas targets are characterized. The different x-ray generation mechanisms studied include nonlinear Thomson scattering and betatron x-rays from laser wakefield acceleration. Gas targets include a gas jet nozzle and staged gas cells.

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