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New Optical Diagnostics for Equation-of-State Experiments on the Janus Laser[1] DYLAN K. SPAULDING, UC Berkeley, DAMIEN G. HICKS, RAYMOND F. SMITH, JON H. EGGERT, Lawrence Livermore National Laboratory, R. STEWART MCWILLIAMS, UC Berkeley, GILBERT W. COLLINS, Lawrence Livermore National Laboratory, RAYMOND JEANLOZ, UC Berkeley —
We report on the first implementation of both a streaked optical pyrometer (SOP) and nanosecond broadband reflectometry diagnostic for observation of ∼Mbar laser-driven dynamic compression experiments on the Janus laser at Lawrence Livermore National Laboratory. Temporally and spatially resolved optical pyrometry has been performed in the visible spectrum to measure self-emission from the sample in parallel with velocimetry and reflectivity measurements. A variety of materials have been investigated under ramp-compression (ICE) and shock-loading conditions with absolute temperatures obtained via a greybody comparison. Furthermore, a nanosecond, time-resolved, broadband reflectivity diagnostic has been successfully demonstrated and is being developed for permanent use in combination with pyrometry for equation-of-state measurements. Results from both diagnostics are discussed for materials including SiO2, diamond, MgSiO3 and MgO.

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