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X-Ray Spectroscopy of Shock-Ignition Implosions[1] R.C. MANCINI, R. FLORIDO[2], T. NAGAYAMA, Physics Department, University of Nevada, Reno, NV 89557, USA, R. TOMMASINI, Lawrence Livermore National Laboratory, Livermore, CA 94550, USA, J. DELETTREZ, S.P. REGAN, V. SMALYUK, Laboratory for Laser Energetics, University of Rochester, NY 14623, USA — We discuss the observation and spectroscopic analysis of argon K-shell x-ray line spectra from argon-doped deuterium-filled OMEGA direct-drive shock-ignition implosions based on data recorded with streaked crystal spectrometers. The argon line spectrum is primarily emitted at the collapse of the implosion thus providing a spectroscopic signature of the state of the imploded core. The observed spectra includes parent and satellite line transitions in H-, He- and Li-like Ar ions thus covering a broad photon energy range from 3200 eV to 4200 eV with a spectral resolution power of approximately 500. Both optically thick and thin lines are simultaneously modeled, including line overlapping and Stark-broadening effects. The spectroscopic analysis results show core temperature and density time-histories associated with the collapse implosions. A comparison is also made with LILAC hydrodynamic simulations.

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[2]Permanent address: Departamento de Física, ULPGC, Spain

R. Florido
Physics Dept University of Nevada, Reno, NV 89557, USA

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