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Laser-driven 6-16 keV x-ray imaging and backlighting with spherical crystals M. SCHOLLMEIER, P.K. RAMBO, J. SCHWARZ, I.C. SMITH, J.L. PORTER, Sandia National Laboratories — Laser-driven x-ray self-emission imaging or backlighting of High Energy Density Physics experiments requires brilliant sources with keV energies and x-ray crystal imagers with high spatial resolution of about 10 μm. Spherically curved crystals provide the required resolution when operated at near-normal incidence, which minimizes image aberrations due to astigmatism. However, this restriction dramatically limits the range of suitable crystal and spectral line combinations. We present a survey of crystals and spectral lines for x-ray backlighting and self-emission imaging with energies between 6 and 16 keV. Ray-tracing simulations including crystal rocking curves have been performed to predict image brightness and spatial resolution. Results have been benchmarked to experimental data using both Sandia's 4 kJ, ns Z-Beamlet and 200 J, ps Z-Petawatt laser systems.

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