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**A platform for detecting material melting from shock compression using the NIF x-ray diffraction diagnostic TARDIS** CHRISTOPHER WEHRENBERG, RICHARD KRAUS, DAVE BRAUN, RYAN RYGG, FEDERICA COPPARI, AMY LAZICKI, JAMES MCNANEY, JON EGGERT, Lawrence Livermore National Laboratory — A series of experiments were performed on NIF to develop a platform to detect material melting during shock compression using x-ray diffraction. The unique pulse shaping on NIF can be utilized to directly-drive a steady shock into an ablator and material sample while simultaneously creating an x-ray source to probe the material state. Sharp diffraction lines are observed when the material is in the solid state, while broad diffuse lines are seen when in the liquid state, providing an unambiguous signal for shock driven melting. Several shots were performed in which a shock of 50-80 GPa was driven into a Pb sample while a Ge foil was used as an x-ray source probe. Laser conditions were varied to create a suitable x-ray source that provides a short, bright burst of He-alpha emission from the Ge while maintaining a low background level on the image plates contained in the TARDIS diagnostic. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344.

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