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XFEL diffraction measurements of shocked Fe and Fe alloys for planetary science[1] ANDREW KRYGIER, LLNL, Livermore, CA, M HARMAND, G MORARD, R NEMAUSAT, G FIQUET, IMPMC, France, E MCBRIDE, K APPEL, DESY, Germany, B ALBERTAZZI, A BENUZZI-MOUNAIX, M KOENIG, T VINCI, LULI, France, R KODAMA, K MIYANISHI, N OZAKI, Osaka University, Japan, N HARTLEY, HZDR, Germany, Z KONOPKOVA, European XFEL, Germany, E GALTIER, H-J LEE, B NAGLER, SLAC, Menlo Park, CA, V SVITLYK, ESRF, France — Earth's core is composed of Fe mixed with small amounts of light elements like Si, O, and C. Determining the phase relations of Fe and derivative alloys is important for understanding the cores of Earth and terrestrial exoplanets. High pressure and temperature conditions can be achieved with high power lasers, but the states are highly transient and their characterization has been limited by the lack of appropriate platforms. The recent advance of facilities with high-power lasers coupled to XFELs enables characterization of shocked states with the powerful suite of X-ray techniques used by the static community. Here we present results from recent X-ray diffraction measurements of shocked Fe alloys at the coupled XFEL-optical laser at SACLA (EH5) and LCLS (MEC).

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