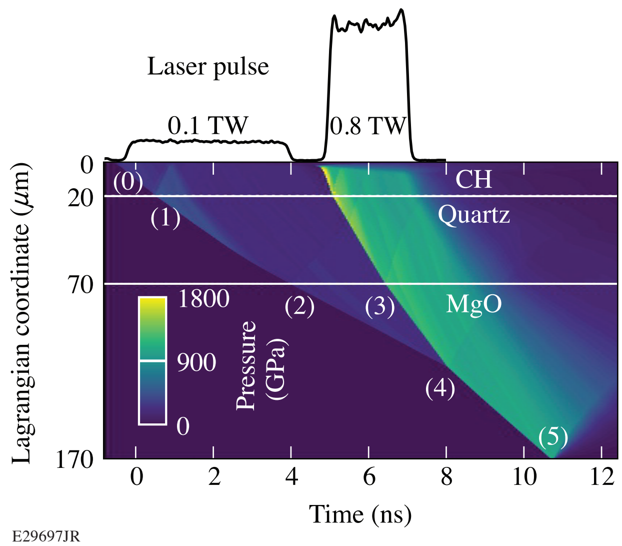
About the Cover:

The cover depicts the phase diagram of magnesium oxide (MgO) and the newly measured melting curve (solid black). Various theoretical predictions for the phase diagram and melting curve are given with dashed–dotted lines. Core–mantle boundary conditions of Saturn and of 1-, 7.5-, and 15-Earth-mass super-Earths are indicated. The principal Hugoniot (blue curve) defines the states that are accessible with a single shock wave. With single-shock experiments, the melt curve can only be explored up to the pressure where it crosses the principal Hugoniot—600 GPa in MgO. A different technique was necessary to probe melting at higher pressures. A double-shock self-impedance–matching technique was used to measure the melt curve of MgO to 2000 GPa (20 Mbar); this is the highest pressure to which any material's melt curve has been probed experimentally.



On the cover figure, solid gray circles represent the first shock B1 states in this work; pressure was measured and temperature was taken from previous work on the principal Hugoniot of MgO. Red open and solid circles are the second shock states; both pressure and temperature were measured. The solid red circles indicate points that are interpreted to lie on the melt curve of MgO because of a lack of observed temperature increase over a wide pressure range due to the latent heat of melting. We find that at 1950 GPa, the measured melting temperature of MgO is 17,600 K; this is 17% lower than recent theoretical predictions (purple dashed–dotted curve). This double-shock technique, depicted in the figure above, will lead to new advances in probing phase-transition behavior in transparent materials to multi-terapascal conditions.

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