## Shock experiments and deep-Earth geophysics: on the melting of MgO and the composition of the outer core

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This talk will introduce the shock compression method for determining the equation of state and phase relations of Earth materials at conditions relevant to the lower mantle and outer core. We will then consider two important unsolved problems: (1) the highly uncertain melting temperature of MgO at lower mantle pressures, which we have addressed with shock measurements of temperature and sound speed in targets pre-heated to 2300 K and then shocked to 250 GPa; and (2) whether there is a combination of light elements mixed in with the liquid Fe-Ni that can explain the seismological profile of the outer core, which he have addressed by using shock experiments to validate an ab initio molecular dynamics-based multicomponent equation of state. The result suggests that the outer core is not a single homogeneous and adiabatic layer.