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Shock compression of D2 to 500 GPa along the principal Hugoniot[1] A. FERNANDEZ-PANELLA, D. FRATANDUONO, M. MILLOT, P. CELLIERS, J. EGGERT, Lawrence Livermore Natl Lab, M. GREGOR, T. R. BOEHLY, G. W. COLLINS, Laboratory for Laser Energetics, M. DESJARLAIS, Los Alamos National Laboratory, LOS ALAMOS NATIONAL LABORATORY COLLABORATION, LABORATORY FOR LASER ENERGETICS COLLABORATION, LAWRENCE LIVERMORE NATIONAL LABORATORY TEAM — Impedance-match measurements along the principal Hugoniot of deuterium using an Al standard were carried out about 10 years ago at the OMEGA and the Z facilities. The data at the highest pressures (near 200 GPa) suggest a systematically softer response than current equation of state (EOS) models, although the measurement uncertainties are too large to confirm a disagreement with the models. Below 100 GPa, the Omega data shows a much stiffer response than the Z data, associated to a possible plasma phase transition (PPT). We have investigated these issues with recent experiments at the OMEGA laser facility, and we present new impedance-match data along the deuterium principal Hugoniot as well as double shock data in the 80-500 GPa range obtained with higher measurement accuracy using alpha quartz as the impedance match standard. This new data suggests that the deuterium Hugoniot may indeed be softer than the models predict and it doesn't show sign of a PPT.

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