Ultrafast pump-probe experiemnts for planetary materials using high-power lasers and XFEL

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Materials at high pressures and temperatures are of great current interest for warm dense matter (WDM) physics, planetary sciences, and inertial fusion energy research. At the high-energy density (HED) conditions, the micro-structures of material significantly influence the behavior and properties. Ultra-short X-ray pulse, *i.e.*, X-ray free electron laser (XFEL), is a unique and powerful tool to directly observe a structure and to reveal the time scale of the structural change under the dynamic high pressures. Here we present recent experimental results on shock-compressed planetary materials using high-power laser and XFEL.

