SHOCK13-2013-000626

Abstract for an Invited Paper
for the SHOCK13 Meeting of
the American Physical Society

**Observation of H/He Demixing Under Deep Jovian Planetary Conditions**

STEPHANIE BRYGOO, CEA

Giant gas planets, such as Jupiter, Saturn and most of the exoplanets discovered so far, consist mostly of hydrogen and helium. A major source of influence for their interior models is the possibility of demixing for warm dense hydrogen/helium mixtures. As proposed 30 years ago by Salpeter and Stevenson, H/He phase separation should completely change the interior structure and the evolution of the planets when it happens (sometimes pictured as a He rain). We will present our experimental approach to observe this separation by making a high pressure experiment on earth. It is based on the concept of laser shock in diamond anvil cells. This has been first applied successfully to determine the equation of state of warm dense helium and warm dense hydrogen. It will be shown that a pre-compression of 4.0 GPa is necessary to reach the thermodynamic conditions of deep Saturn. A new target design has been developed for that. Experiments have been performed by using 6 KJ of the OMEGA laser facility.