

UCLA Department of Physics & Astronomy

COLLOQUIUM

Thursday, May 29th at 4 p.m.

1-434 PAB

The Magma Ocean and Silicate Dynamos

Lars Stixrude

(UCLA)



The Earth may have begun in a completely molten state, a global magma ocean, with silicate liquid extending from the surface to the boundary with the iron-rich core at a pressure of 140 GPa, and temperature of more than 4000 K. The magma ocean may have survived for billions of years and left signatures in today's Earth in various forms including a remainder of deep melt, chemical heterogeneity in the mantle, or paleomagnetic records. However, these signals are still difficult to interpret because of a lack of basic knowledge of the behavior of liquid silicates at extreme conditions. To help answer fundamental questions, we have performed first principles quantum mechanical simulations at the conditions of the deep, early Earth. These simulations lend new insight into the thermal and chemical evolution of the magma ocean and the possibility of a silicate dynamo early in Earth's history. I'll discuss the origins of electronic conduction in this system and explore the possibility of magma oceans and silicate dynamos in other planets, including those in our solar system and in rocky exoplanets.

Refreshments at 3:30 p.m. on the PAB Patio. Undergraduates Welcome!