

LMS Seminar

Plasticity, deformation and microstructures under deep planetary interior conditions

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Date, time, and venue

January 15, 2026 (2 – 3 pm), Amphithéâtre Pole Mécanique

Abstract

The deformation of solid materials and the induced microstructures are important in the geosciences as, combined with other observations, they can be used to unravel the history and geodynamical contexts of various regions of the Earth. The relevant thermodynamic conditions, however, are extreme with pressures over a megabar and temperatures of several thousands of K. To this end, our group in Lille has developed an expertise in the study of plastic deformation and microstructure under extreme conditions, using static compression devices (large volume press, diamond anvil cells, etc) and, more recently, shock compression. Experiments and sample properties are studied in situ, typically at large scale facilities such as synchrotrons and X-ray free electron lasers using powder or multigrain X-ray diffraction. In this presentation, I will show the methods we use and some of our recent results on oxides relevant to planetary mantles and iron for planetary cores.

About the speaker

S. Merkel is a professor of physics at Univ. Lille since 2010. He received a PhD in Earth science from the Ecole Normale Supérieure de Lyon in 2002 and has worked at ENS Lyon, the Carnegie Institution for Science and the University of California at Berkeley in the US, and the University of Tokyo in Japan. His research focuses on extreme conditions experiments, microstructures and their relations to phase transformations and plastic deformation, and the dynamics and history of the deep Earth.

