MM 7 Hauptvortrag Peter Schall

Zeit: Freitag 14:00–14:30 Raum: TU H1058

Hauptvortrag MM 7.1 Fr 14:00 TU H1058

Colloidal Particles - a 3-D Analogue Computer for Materials Research — •Peter Schall[1], David A. Weitz[1,2], and Frans Spaepen[1] — [1]Division of Engineering and Applied Sciences, Harvard University, Cambridge MA, U.S.A. — [2]Department of Physics, Harvard University, Cambridge MA, U.S.A.

Colloidal suspensions are widely used to study a variety of phenomena in hard condensed matter physics. The particles - several ten nanometers to micrometers in size - self organize into structures similar to atoms in different phases of condensed matter. Crystalline as well as amorphous states can be prepared. Being several orders of magnitude larger than atoms, colloidal particles offer the unique possibility for studies at convenient length and time scales. The positions of the individual particles can be determined accurately in three dimensions using confocal microscopy. We perform deformation experiments on colloidal crystals and glasses to get deeper insight into atomic processes of plastic deformation. We show that colloidal crystals exhibit dislocations in close analogy to dislocations in hard materials. Due to the larger size and the extended time scale of the colloidal particles, we are able to follow the nucleation of dislocations and their propagation in situ and on the particle scale. We also track the motion of the particles in amorphous suspensions and we are able to identify local shear events that give rise to the macroscopic deformation. We will present a variety of experiments on colloidal crystals and glasses, such as the epitaxial crystal growth on a stretched substrate, shear experiments, and "nano"indentation experiments using a conventional sewing needle as an indenter.