LadHyX Seminar – February 13, 10:45

Yoel Forterre
(IUSTI, Marseille)

Grains in Fluids: from Shear-Thickening to Active Avalanches in Plant Cells

Over the past twenty years, progress has been made in our understanding of how granular matter flows, a topic of both basic and practical interest. In this seminar, I will illustrate how physical phenomena at the particle level (fluid drag, colloidal forces, particle agitation) can profoundly affect the flow behavior of a mixture of grains and fluids close to the jamming transition. First, I will show that the short-time response of a dense suspension under impact is entirely controlled by the coupling between transient effects (Reynolds dilatancy) and the interstitial fluid pressure. I will then discuss how the addition of short-range repulsive forces between grains combined with friction can explain the dramatic shear-thickening behavior displayed by some suspensions like cornstarch. Finally, I will show how the sensor of gravity of plants relies on an active granular medium at the cellular level to achieve its sensitivity.