

LadHyX Seminar –Januray 16, 10:45

Dominic Vella
(Oxford)

Droplets on thin, deformable substrates

The interaction of a thin, deformable object, such as a polymeric sheet, with a liquid droplet occurs in a range of problems: from wet dog hairs clumping to the stiction of components during the fabrication of Microelectromechanical System (MEMS). Much previous work focuses on the interaction between the two in 2D geometries, since this allows the deformable object to bend without changing its length. However, in three-dimensions, things are qualitatively different: a naturally flat object cannot bend in more than one direction without stretching. This geometrical restriction has consequences for a number of apparently simple problems, including the gentle poking of a floating elastic sheet and the equilibrium of a liquid droplet on a thin, supported membrane. I will discuss the consequences of three-dimensional deformations, focussing in particular on how and why intuitive ideas about the stresses in such sheets may break down. I will also show how, even in 2D situations, deformability may cause droplet motion.