Ypatia 2022 - June 8-10, 2022

jeudi 9 juin 2022

Abstract: The classical obstacle problem consists of finding the equilibrium position of an elastic membrane whose boundary is held fixed and which is constrained to lie above a given obstacle. By classical results of Caffarelli, the free boundary is C^∞ outside a set of singular points. Explicit examples show that the singular set could be in general $(n-1)$-dimensional --that is, as large as the regular set. In a recent paper with Ros-Oton and Serra we show that, generically, the singular set has zero $\mathcal H^{n-4}$ measure (in particular, it has codimension 3 inside the free boundary), solving a conjecture of Schaeffer in dimension $n \leq 4$. The aim of this talk is to give an overview of these results.Abstract: The Tits alternative, initially proven by Jacques Tits around 1972, concerns the structure of groups of matrices, more precisely of subgroups of GL(V) for any finite dimensional vector space V . As we shall see, there are three interacting perspectives in the Tits alternative, coming from algebra, geometry, and dynamics. What is the precise statement and the meaning of this alternative? How is it proven? Does it hold in other groups, for instance in groups of diffeomorphisms of compact manifolds, or in groups of algebraic transformations? I will discuss these questions at an elementary level, with a focus on explicit examples and an emphasis on the dynamical systems viewpoint. (12:00 - 13:00)