Title: Continuous Incidence Theory and its Applications to Number Theory and Geometry

It is a classical problem to study incidences between a finite number of points and a finite number of geometric objects. In this presentation, we see that continuous incidence theory can be used to derive a number of results in geometry, geometric measure theory, and analytic number theory. The applications to geometry include a fractal variant of the regular value theorem. The applications to geometric measure theory include a generalization of Falconer distance problem in which we prove that a compact subset of $\mathbb{R}^d$ of sufficiently large Hausdorff dimension determines a positive proportion of all $(k+1)-$configurations described by certain restrictions. The applications to Number Theory include counting integer lattice points neighborhoods of variable coefficient families of surfaces.