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Title: Uniform distribution and geometric incidence theory

Abstract: The Szemerédi-Trotter Incidence Theorem, a central result in geometric combinatorics, bounds the number of incidences between n points and m lines in the Euclidean plane. Replacing lines with circles leads to the unit distance problem, which asks how many pairs of points in a planar set of n points can be at a unit distance. The unit distance problem breaks down in dimensions 4 and higher due to degenerate configurations that attain the trivial bound. However, nontrivial results are possible under certain structural assumptions about the point set. In this talk, we will give an overview of the history of these and other incidence results. Then we will introduce a quantitative notion of uniform distribution and use that property to obtain nontrivial bounds on unit distances and point-hyperplane incidences in higher-dimensional Euclidean space. This is based on joint work with Alex Iosevich and Emmett Wyman.