CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES

COLLOQUIUM

Thursday, May 2
2:00 – 2:50 PM
Room EDB 126

THE KAKEYA PROBLEM
IN ALGEBRA AND ANALYSIS

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Abstract: The Kakeya "needle" problem, posed by Kakeya in 1918, is a classical question in analysis that asks how small a subset of the Euclidean plane can be, if it contains a unit line segment in every possible direction. This question was answered by Besicovitch in 1919, who gave the rather surprising answer that such sets can have area zero, and it was subsequently shown that such sets necessarily have dimension 2. It remains open to this day, however, whether the minimal dimension of such a "Kakeya set" in n-dimensional Euclidean space must be n. In the late 1990s, Wolff proposed an algebraic version of this problem in the setting of a finite field, and a major advance in this area was made by Dvir in 2008 using a stunning idea known as the "polynomial method". I will describe some of the historical results on Kakeya sets and their applications, along with some work of myself and others on bridging the gap between the algebraic and analytic versions of the Kakeya problem.