Charles Wolf
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Title: On the number of ordinary lines in complex space

Abstract: The classical Sylvester-Gallai theorem states the following: Given a finite set of points in the 2-dimensional Euclidean plane, not all collinear, there must exist a line containing exactly 2 points (referred to as an ordinary line). In a recent result, Green and Tao show that a non-collinear set of n points in the plane determines at least n/2 ordinary lines, for n large enough.

In this talk we will consider the situation over the complex numbers. While the Sylvester-Gallai theorem as stated is false in the complex plane, Kelly's theorem states that if a finite point set in 3-dimensional complex space is not contained in a plane, then there must exist an ordinary line. Using techniques developed for bounding ranks of design matrices, we will show that such a point set must determine at least 3n/2 ordinary lines. (Joint work with Abdul Basit, Zeev Dvir and Shubhangi Saraf.)