

## **abstract**

Marston Morse Lectures

Topic:

Speaker:

Affiliation:

Date:

Time/Room:

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Incidence geometry is a part of combinatorics that studies the intersection patterns of geometric objects. For example, suppose that we have a set of  $L$  lines in the plane. A point is called  $r$ -rich if it lies in  $r$  different lines from the set. For a given  $L$  and a given  $r$ , how many  $r$ -rich points can there be? This question is answered by a theorem of Szemerédi and Trotter from the early 80's. Different generalizations of this theorem are a central topic in incidence geometry. For example, it would be interesting to know what happens if we consider  $k$ -planes in  $\mathbb{R}^n$  instead of lines in the plane. In particular there is a new difficulty for objects of codimension  $> 1$ , such as lines in  $\mathbb{R}^3$ . We explain why this type of problem is hard to understand using previous methods, and how the polynomial method has helped break the 'codimension barrier'.