ALEX COHEN, MIT
Lower bounds for incidences

Lots of problems in combinatorics and analysis are connected to upper bounds for incidences: given a set of points and tubes, how much can they intersect? On the other hand, lower bounds for incidences have not been studied much. We prove that if you choose n points in the unit square and a line through each point, there is a nontrivial point-line pair with distance $\leq n^{-2/3+o(1)}$. It quickly follows that in any set of n points in the unit square some three form a triangle of area $\leq n^{-7/6+o(1)}$, a new bound for this problem.

Joint with Cosmin Pohoata and Dimitrii Zakharov.