Mark Walters: *Finding two points and union free collections*

I will talk about joint work with Imre Leader based on a question Peter asked at the Reading One Day colloquium (in 1997 I think). Namely you want to find two points between 1 and N by asking questions of the form "are both points in the set A?". We point out that this is equivalent to finding a collection of subsets whose pairwise unions are all distinct. We use a variety of probabilistic techniques to obtain a bound of $3.07 \log_2 N$.