Existence thresholds in random posets

Many classical graph theory questions have analogues in the setting of posets. Bollobás famously determined the threshold for the existence of a fixed subgraph H in the random graph. In this talk we study an analogue of this problem for random posets. Specifically, let $\mathcal{P}(n)$ denote the power set of $[n]$ equipped with the inclusion relation (i.e. the Boolean lattice of dimension n). In 1961 Rényi introduced the model $\mathcal{P}(n,p)$ which is obtained from $\mathcal{P}(n)$ by retaining each element of $\mathcal{P}(n)$ with probability p, independently of all other choices. We determine the threshold for $\mathcal{P}(n,p)$ to contain any fixed subposet P. Our answer exhibits quite different behaviour compared to the analogous result in the random graph setting.

This is joint work with Victor Falgas-Ravry, Klas Markström and Yi Zhao.