Bootstrap percolation on random k-uniform hypergraphs

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A bootstrap percolation process on a hypergraph $H = H(V; E)$ with activation threshold an integer $r \geq 1$ is a deterministic process which evolves in rounds. Every vertex is in one of two possible states: it is either infected or uninfected. The set of initially infected vertices is given by $\mathcal{A}(0)$. In each round of the process every uninfected vertex v which has at least r infected neighbours becomes infected. Once a vertex has become infected it remains infected forever. The process stops once no additional vertices become infected.

We consider the case when the hypergraph H is a random k-uniform hypergraph and $\mathcal{A}(0)$ consists of a given number of vertices chosen uniformly at random. We establish a threshold a_c such that if $|\mathcal{A}(0)| > (1 + \delta)a_c$ then with high probability almost every vertex becomes infected, while if $|\mathcal{A}(0)| < (1 - \delta)a_c$ then with high probability only a "few" additional vertices become infected.

This is joint work with M. Kang and C. Koch.