The giant component in a degree-bounded processss

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Graph processes \((G(i), i \geq 0)\) are usually defined as follows. Starting from the empty graph on \(n\) vertices, at each step \(i\) a random edge is added from a set of available edges. For the \(d\)-process, edges are chosen uniformly at random among all edges joining vertices of current degree at most \(d - 1\).

The fact that, during the process, vertices become 'inactive' when reaching degree \(d\) makes the process depend heavily on its history. However, it shares several qualitative properties with the classical Erdos-Renyi graph process. For example, there exists a critical time \(t_c\) at which a giant component emerges, whp (that is, the largest component in \(G(tn)\) goes from logarithmic to linear order).

In this talk we consider \(d \geq 3\) fixed and describe the growth of the size of the giant component. In particular, we show that whp the largest component in \(G((t_c + \varepsilon)n)\) has asymptotic size \(cn\), where \(c \sim c_d \varepsilon\) is a function of time \(\varepsilon\) as \(\varepsilon \to 0+\).

The growth, linear in \(\varepsilon\), is a new common qualitative feature shared with the Erdos-Renyi graph process and can be generalized to hypergraph processes with different max-allowed degree sequences. This is work in progress jointly with Lutz Warnke.