CHRISTINA GOLDSCHMIDT, University of Oxford
The scaling limit of the critical random graph

The basic object in this talk will be the celebrated Erdős-Rényi random graph model: we take n labelled vertices, any pair of which we connect independently with probability p. A fundamental fact about this model is that it undergoes a phase transition. Set $p = c/n$, where c is a constant. Then for $c < 1$, the components of the graph have size which is at most of order $\log n$; for $c > 1$, there is a single *giant* component of size order n and all other components again have size at most of order $\log n$. In order to investigate the critical behaviour, it is useful to look inside the *critical window*, where $p = 1/n + \lambda n^{-4/3}$ and $\lambda \in \mathbb{R}$. Here, it turns out that the largest components all have size $n^{2/3}$. Moreover, they are close to being trees, in that each differs from a tree by a number of edges which stays bounded in expectation as $n \to \infty$. Viewing the components as random metric spaces in which we rescale the graph distance by $n^{-1/3}$, we are able to give a complete description of the scaling limit of the critical random graph. The limiting object has a satisfyingly elegant description as a sequence of continuum random trees in each of which a finite number of random vertex-identifications has been made.

This is joint work with Louigi Addario-Berry (McGill) and Nicolas Broutin (INRIA Paris-Rocquencourt).