Mathematics and CS Seminar

Computation of the critical point for the random-cluster model on $\mathbb{Z}^2$ via parafermionic observables

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The random-cluster model (or Fortuin-Kasteleyn percolation) plays a key role in studies of models on lattices, as it is connected to many of them, and the results obtained for random-cluster model can be then applied for other models. In this talk I will present another proof of the well-known fact that for the square lattice the critical probability of the random-cluster model $p_{cr}$ is equal to $\frac{\sqrt{q}}{1+\sqrt{q}}$ for $q$ in $[1,4]$. Unlike other proofs, this one involves the method of parafermionic observables applied to exploration paths in boxes and strips of growing size. This result was presented in a joint work with E. Mukoseeva during my PhD under the supervision of H. Duminil-Copin.

Joint work with Christopher Lutsko (Bristol).