Critical temperature of the square lattice Potts model
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In this talk, we derive the critical temperature of the q-state Potts model on the square lattice ($q \geq 2$). More precisely, we consider a geometric representation of the Potts model, called the random-cluster model. Spin correlations of the Potts model get rephrased as connectivity properties of the random-cluster model. The critical temperature of the Potts model is therefore related to the critical point of the random-cluster model. For the later, a duality relation allows us to compute the critical value using a crossing estimate (similar to the celebrated Russo-Seymour-Welsh theory for percolation) and a sharp threshold theorem. This result has many applications in the field and we will briefly mention some of them at the end of the talk. *Joint work with V. Beffara.*