

Jacopo De Simoi (University of Maryland). *Complex dynamics in a model for phase transitions.*

Abstract. Hierarchical lattices are a class of lattices that are fixed points of a given decoration procedure acting on the space of all graphs. In the eighties a work by Derrida, De Seze and Itzykson showed that it is possible to associate to each decoration procedure a so-called renormalization map which is an endomorphism of the Riemann sphere $\hat{\mathbb{C}}$. Using a (then) recent result by M.Lyubich, they showed how the invariant measure associated to the renormalization map is indeed supported on the phase transition locus of an Ising (or Potts) model on the hierarchical lattices associated to the selected decoration. In this work we naturally extend this idea to a broader class of models, namely hierarchical hypergraphs. The renormalization map becomes a rational map on a complex multiprojective space of appropriate dimensions. Getting rigorous results in this setting is harder due to the lack of a fully developed theory for iterations of rational maps in more than one dimension, but this does not prevent a numerical study of the dynamics. Moreover physical intuition can possibly shed some light on some unclear phenomena that occur in high-dimensional complex dynamics.

This is a joint work with S. Marmi.