SEMINARI D'ANÀLISI UAB-UB **Curs 2012–2013**

Dilluns 3 de desembre del 2012, 16:00h

Aula A1 (CRM)

Phase transitions and equilibrium measures.

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ABSTRACT:

The large-scale behavior of many models in mathematics and physics, such as a unitary random ensemble, the non-intersecting Brownian paths, or the asymptotics of orthogonal polynomials with respect to a varying weight, are described in terms of a measure solving an extremal problem of the logarithmic potential theory. This measure (the equilibrium measure in an external field) provides a crucial information: the associated functionals give us the leading terms of the asymptotics, and its support is typically the place where oscillations occur. In particular, the phase transitions in the random matrix models are associated to the change of the topology and connectivity of the support of the equilibrium measure under variation of the external field.

In a rather broad class of problems the potential (or the external field) on the real line is given by a polynomial. Much has been written about the phase transitions for the polynomial potentials. In this talk we show that the main known (and a few unknown) facts can be derived in a unified fashion from two basic properties of the equilibrium measures. As an illustration, we discuss in more detail the case of the quartic external field, focusing on the possible transitions between different configurations of the limiting spectrum under the variation of the total mass of the measure.

This is a joint work in progress with E.A. Rakhmanov and R. Orive.