Kempner Colloquium

Random lozenge tilings and other integrable probabilistic models

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I will discuss theprobabilistic model of randomly tiling a hexagon drawn on the regular triangular latticeby lozenges of three types (equivalent formulations: dimer models on the honeycomb lattice, or random 3D stepped surfaces glued out of 1x1x1 boxes).This model has received a significant attention over the past 20 years (first results - the computation of the partition function -date back to P. MacMahon, 100+ years ago).Kenyon, Okounkov, and their co-authors (1998-2007) proved the law of large numbers: when the polygonis fixed and the mesh of the lattice goes to zero, the random 3D surface concentrates around a deterministic limit shape, which is algebraic. I will discuss finer asymptotics:local geometry, behavior of interfaces between phases (which manifests the Kardar-Parisi-Zhang universality), and global fluctuations of random surfaces (described by the Gaussian Free Field), as well as dynamical models associated with random tilings.

I also plan to briefly survey the general phenomenon of "integrable" probabilistic models, in which the presence ofexplicit formulas describing their distributions allow for an analysis byessentially algebraic methods.

December 17, 2013
4:00 p.m.
MATH 350