

# The dimer model: equilibrium and non-equilibrium aspects

Fabio Toninelli

This course focuses on various mathematical aspects of lattice dimer models. These are very classical two-dimensional statistical mechanics models, that are exactly solvable in some sense (Kasteleyn, 1961): partition function and correlations can be computed in determinantal form. Recently there has been a new wave of interest in dimer models, both in probability, combinatorics and mathematical physics. One reason is that these models, as well as other two-dimensional critical models, exhibit conformal invariance properties. Another interesting aspect is that they allow to obtain very nice Markov dynamics of two-dimensional interfaces, whose large-scale dynamical behavior can be studied.

## Detailed contents:

- Kasteleyn theory (partition functions, correlations, determinantal properties)
- correlations et representation dterminantale
- thermodynamic limit and ergodic Gibbs measures
- height fluctuations and massless Gaussian field
- dynamics of dimer models: mixing time and hydrodynamic limits.

## References :

- R. Kenyon, Lectures on dimers, arXiv:0910.3129.
- F. Toninelli, Lecture notes on the dimer model, <http://math.univ-lyon1.fr/homes-www/toninelli/noteDimeri.pdf>