

Razumov-Stroganov–type Correspondences in the 6-Vertex and $O(1)$ Dense Loop Model

Andrea Sportiello

CNRS, and LIPN, Université Paris 13, Sorbonne Paris Cité

Razumov and Stroganov conjectured in 2001 a correspondence between the enumerations of Fully-Packed Loops (FPL) on a square domain (a version of the 6-Vertex Model), refined according to the link pattern, and the ground-state components of the Hamiltonian in the periodic XXZ Quantum Spin Chain at $\Delta = -1/2$, a realisation of the $O(1)$ Dense Loop Model (DLM) on a cylinder.

Extensions have been considered later on. In particular, Di Francesco in 2004 suggested a one-parameter generalization: on the ‘DLM side’, the ground state of the Hamiltonian H is replaced by the one of the Scattering Matrix, $S(t)$; on the ‘FPL side’, one also considers the refinement on the last row.

Similar conjectures existed for two large families of domains: those with a ‘hidden dihedral symmetry’, or with ‘vertical symmetry’, respectively. Both the basic and extended conjectures have been proven, in the dihedral case, by L. Cantini and the speaker, while the vertical cases are open.

We present the subject, its implications on Algebraic Combinatorics and Statistical Mechanics, and how the forementioned conjectures have been proven.

