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Many new conjectures on Fully-Packed Loop configurations

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We deal with one of the favourite objects of Philippe: Fully-Packed Loop configurations, in domains where the Razumov–Stroganov conjecture holds. Recall that the RS conjecture relates FPL's and the steady state of the $O(1)$ dense loop model. In short, it states that the refined enumeration of FPL's according to the (black) link pattern is proportional to the aforementioned steady state. The conjecture exists in two main flavours: “dihedral” (ASM, HTASM, QTASM on one side, and the DLM on the cylinder on the other side), and “vertical” (VSASM, UASM, UUASM, OSASM, OOASM on one side, and the DLM on the strip on the other side). Together with L. Cantini, we gave two proofs (in 2010 and 2012) of the conjecture in the dihedral cases, but, despite the efforts of ourselves and others, the vertical case is still unsolved.

We recently looked back at the FPL configurations pertinent to one of the unsolved “vertical” cases, namely the UASM (ASM on a $2n \times n$ rectangle with U-turn boundary conditions on one of the long sides). We have looked at the refinement according to the black and white link patterns, and the overall number of loops. This doesn't seem to help in understanding the Razumov–Stroganov conjecture, but leads to many more conjectures, suggesting the existence of a remarkable deformation of Littlewood–Richardson coefficients, somewhat in the same spirit, but apparently by a completely different mechanism, to “FPL in a triangle” studied by P. Zinn-Justin and by Ph. Nadeau among others (including Philippe!).

Work in collaboration with L. Cantini.

Orateur: SPORTIELLO, Andrea (LIPN, CNRS/Université Sorbonne Paris Nord)