The two periodic Aztec diamond

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A random domino tiling of an Aztec diamond can be mapped to an interacting particle system on a discrete lattice that in the liquid (or disordered) region has features of a 2D Coulomb gas. In a two periodic weighting of the Aztec diamond a new gas phase emerges with faster decay of correlations.

I present joint work with Maurice Duits (KTH Stockholm) on this and more general periodic tiling model. We find a double contour integral formula for the correlation kernel containing matrix valued orthogonal polynomials (MVOP). With the Riemann-Hilbert problem for MVOP at hand, this gives an approach towards asymptotic analysis, which turns out to become fully explicit for the two periodic Aztec diamond