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The two-periodic Aztec diamond and matrix valued orthogonality

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I will discuss how polynomials with a non-hermitian orthogonality on a contour in the complex plane arise in certain random tiling problems. In the case of periodic weightings the orthogonality is matrix valued. In work with Maurice Duits (KTH Stockholm) the Riemann-Hilbert problem

for matrix valued orthogonal polynomials was used to obtain asymptotics for domino tilings of the twoperiodic Aztec diamond. This model is remarkable since it gives rise to a gaseous phase, in addition to the more common solid and liquid phases.

Reference:

M. Duits and A.B.J. Kuijlaars,

The two periodic Aztec diamond and matrix valued orthogonal polynomials, J. Eur. Math. Soc. 23 (2021), 1075-1131.

Primary author: Prof. KUIJLAARS, Arno (Katholieke Universiteit Leuven)

Co-author: Prof. DUTIS, Maurice (KTH Stockholm)

Presenter: Prof. KUIJLAARS, Arno (Katholieke Universiteit Leuven)