Asymptotics of multiple orthogonal polynomials for cubic weight

05.02   **Andrei Martínez Finkelshtein**
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Abstract: We consider the type I and type II multiple orthogonal polynomials (MOPs), satisfying non-hermitian orthogonality with respect to the weight $\exp(-z^3)$ on two unbounded contours on the complex plane. Under the assumption that the orthogonality conditions are distributed with a fixed proportion α, we ?nd the detailed (rescaled) asymptotics of these MOPs, and describe the phase transitions of this limit behavior as a function of α. This description is given in terms of the vector critical measure, the saddle point of the energy functional comprising both attracting and repelling forces. These critical measures are characterized by a cubic equation (spectral curve), and their components live on trajectories of a canonical quadratic differential on the Riemann surface of this equation. The structure of these trajectories and their deformations as function of α plays the crucial role.

This is a joint work with Guilherme L. Silva (University of Michigan, Ann Arbor).