Asymptotics of the Fourier transform of orthogonal polynomials of singular measures, and quantum intermittency

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We study of the Fourier transform of orthogonal polynomials as a means of obtaining information on the multifractal properties of singular measures on the one hand, and on the dynamics of almost periodic quantum systems on a lattice, and chains of linear classical oscillators, on the other hand.

In this investigation, the role of potential theory is unveiled by the usage of Mellin transform techniques, that permit to master the asymptotics of the Fourier transforms of single orthogonal polynomials, for large argument.

I will show that a different, mixed order-argument asymptotics is necessary to treat the dynamical phenomenon of quantum intermittency, a property of infinite sums of the Fourier transforms of orthogonal polynomials.

I will show analytical as well as numerical results for balanced measures on real Julia sets, and for singular measures associated with "sparse barriers" Jacobi matrices.