

Disordered Bosons: A Complex Geometric Viewpoint

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Abstract

The mathematics in the talk involves the study of a concrete complex analytic setting from symplectic geometric and probabilistic viewpoints. The motivation comes from a question related to the quantum mechanics of disordered bosons. Unlike the fermionic side where the underlying Lie groups of the classical ensembles are compact, the symmetry groups for ensembles of disordered bosons are typically noncompact. In the bosonic case the basic random matrix models consist of matrices in the Lie algebra $\mathfrak{g} = \mathfrak{sp}_n(\mathbb{R})$. Assuming dynamical stability, their eigenvalues are required to be purely imaginary. In the lecture we will sketch our recent work with K. Schaffert (J.Phys.A.Math.44(2011) 335207) where a method is proposed for constructing ensembles (\mathcal{E}, P) of G -invariant sets \mathcal{E} of such matrices with probability measures P . These arise as moment map direct images from phase spaces X which play an important role in complex geometry and representation theory. We will discuss in detail the toy-model case of $n = 1$, where X is the complex bidisk and P is the direct image of the uniform measure.