Random matrices, statistical mechanics, and hyperbolic symmetry breaking

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We describe a statistical mechanics model with SU(1,1) symmetry and its connection with random band matrices. The "spins" in this model take values in the upper half plane with the hyperbolic metric. In three or more dimensions, we prove that all moments of the spin are finite. This corresponds symmetry breaking and is compatible with the presence of extended states for the random band matrix in 3D. The key ingredients of the proof are the Brascamp-Lieb inequality, a representation using horospherical coordinates and bounds on non uniformly elliptic Greens functions. This is joint work with M. Zirnbauer.