

Abstract Submitted  
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**Rotationally invariant ensembles of integrable matrices**<sup>1</sup> JASEN SCARAMAZZA, EMIL YUZBASHYAN, Department of Physics and Astronomy, Rutgers University, SRIRAM SHASTRY, Physics Department, University of California, Santa Cruz — We construct ensembles of *random integrable matrices* with any prescribed number of nontrivial integrals and formulate *integrable matrix theory* (IMT) – a counterpart of random matrix theory (RMT) for quantum integrable models. A type- $M$  family of integrable matrices consists of exactly  $N - M$  independent commuting  $N \times N$  matrices linear in a real parameter. We first develop a rotationally invariant parameterization of such matrices, previously only constructed in a preferred basis. For example, an arbitrary choice of a vector and two commuting Hermitian matrices defines a type-1 family and vice-versa. Higher types similarly involve a random vector and two matrices. The basis-independent formulation allows us to derive the joint probability density for integrable matrices, in a manner similar to the construction of Gaussian ensembles in the RMT.

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