Title: Integrable Dicke and Jaynes-Cummings models

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Abstract: The Dicke model is an extension of the well-known Jaynes-Cummings model and describes the cooperative interaction between a set of atoms and a single mode of an electromagnetic field. This model is investigated as a quantum integrable system, where an exact solution is known by means of the Bethe ansatz. Unfortunately, a straightforward numerical solution of the resulting Bethe ansatz equations is hampered by the occurrence of numerical singularities. These equations are discussed and a numerical solution method based on the pseudo-deformation of the quasi-spin is implemented as a way to circumvent these singularities. This pseudo-deformation is then also be used to link the Dicke model to the Richardson-Gaudin models.