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**Analysis of the long-range random field quantum anti-ferromagnetic Ising model : Some exact results**[1] JUNICHI INOUE, Hokkaido University, ARNAB DAS, SINP, BIKAS K. CHAKRABARTI, SINP — With the realization in the mid last century, that the Neel state cannot be the ground state of a quantum Heisenberg anti-ferromagnet (AF), considerable effort has gone in search of and in understanding the nature of the ground stateof such and similar quantum AF. Since early 1960s, quantum spin systems described by Ising model in a transverse tunneling field was investigated, particularly because of easy mapping of the quantum system to its equivalent classical system and some cases of exact solubility. However, there has, so far, been very few models with AF interactions. It is well-known, the transverse Ising model with long range interactions is solved exactly, even if the system has some special kind of quenched disorder, like in spin glasses. However, it is not so easy to consider the AF version of the model due to a lack of sub-lattice to capture the Neel ordering at low temperature. In this paper, we introduce and study a solvable quantum AF model. In our model system each spin is influenced by the infinite range AF interactions in a transverse field. We also consider the case under the random fields. By introducing two sub-groups of the spin system, we describe the system by means of the effective single spin Hamiltonian and solve it exactly.

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