Magic Square Game in Spin Systems with Dzyaloshinskii-Moriya Interaction

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Dzyaloshinskii-Moriya (DM) interaction excites the entanglement of spin systems, usually improving the performance of realizing quantum tasks. We will first present our results in quantum metrology [1]. Secondly, we consider the DM interaction in quantum game theory. In particular, we study the winning probability of magic square game played with the thermal entangled state of spin models including DM interaction. We analytically show that although DM interaction excites the entanglement of the system as expected, it surprisingly reduces the winning probability of the game [2].

[2] F. Ozaydin, A. A. Altintas, Scientific Reports 5, 16360 (2015).
[2] F. Ozaydin, arXiv:1609.03881