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**Quantum Entanglement in a Spin Ladder with Ring Exchange<sup>1</sup>**

JUN-LIANG SONG, SHI-JIAN GU, HAI-QING LIN, Institute of Theoretical Physics and Physics Department, The Chinese University of Hong Kong, Hong Kong, China — In this paper we've studied entanglement properties of a spin ladder with ring exchange. Several entanglement properties, e.g. pair concurrence and block-block entanglement were obtained by exact diagonalization method. The relationship between the global phase diagram and ground-state quantum entanglement was investigated. It was shown that block-block entanglement of different block size and configurations manifests richer information of the system. It was also found that the block-block entanglement reaches its maximum or minimum at some QPT points which is also the high symmetry point. The temperature dependence of the entanglement properties is also investigated and it is shown that entanglement is suppressed by the temperature fluctuations and vanishes at some threshold temperatures.

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