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Von Neumann and Renyi Entanglement Entropies in Spin Ladders IVAN GONZALEZ, Centro de Supercomputacion de Galicia, Avda. de Vigo s/n, E-15705 Santiago de Compostela, Spain, ANN B. KALLIN, Department of Physics and Astronomy, University of Waterloo, Ontario, N2L 3G1, Canada, MATTHEW B. HASTINGS, Microsoft Research, Station Q, CNSI Building, University of California, Santa Barbara, CA, 93106, ROGER G. MELKO, Department of Physics and Astronomy, University of Waterloo, Ontario, N2L 3G1, Canada — Density matrix renormalization group (DMRG) algorithm has proven a useful tool to calculate entanglement properties of one- and quasi-one-dimensional condensed matter systems, due to the fact that the reduced density matrix eigenvalue spectrum for some bipartitions of the system is avaliable as a by-product of the algorithm. In this talk, I will present calculations of the von Neumann and Renyi entanglement entropies (EE) on Heisenberg ladders up to seven legs using DMRG. For a bipartition into subregions A and B, the EE for even-leg ladders is constant for subregion sizes larger than the correlation length, while for odd-leg ladders has a logarithmic dependence on the subregion size. Our results indicate that in the limit of a large number of legs the von Neumann EE obeys an area law.

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