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Entanglement Entropy in Quantum Dimer Models

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The scaling of entanglement entropy can be a useful probe of peculiar correlations in many-body ground states. Recently it was proposed that in a topological phase the entanglement entropy contains a universal constant, called the topological entanlement entropy, which reflects the underlying gauge theory for the topological order. Here we examine the effectiveness of the proposal in numerical calculations of finite-size systems, taking a quantum dimer model on the triangular lattice as an example [SF and G. Misguich, arXiv:cond-mat/0612227]. Using the constructions to measure the topological entropy as a combination of entropies on plural areas, we successfully extract a universal constant – the resultant value is remarkably close to $-\ln 2$ expected for $\mathbb{Z}_2$ topological order.