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Entanglement entropy at the quantum critical point of the 2D transverse field Ising model STEPHEN INGLIS, ROGER MELKO, University of Waterloo, RAJIV SINGH, University of California, Davis, ANDERS SANDVIK, Boston University — Entanglement entropy is a quantity that is desirable to examine at quantum critical points in condensed matter systems, because it is expected that sub-leading scaling terms should contain universal coefficients. In dimensions higher than one, these universal coefficients (that are sub-leading to the area law) may possibly be used to identify the universality class of the quantum critical point, much like the central charge in 1D systems. The recent development of zero temperature projector methods for the transverse field Ising model in combination with replica methods for stochastic series expansion quantum Monte Carlo (QMC) allows us to examine this idea, using measurements of Renyi entanglement entropies. We compare zero- and finite- temperature QMC results with series expansion, and discuss the scaling of the Renyi entropies at the 2D critical point in the transverse field Ising model.

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