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Entanglement Scaling at Quantum Phase Transitions in Correlated Electron Systems DANIEL LARSSON, Philipps-Universität Marburg, Germany, HENRIK JOHANNESSON, Göteborg University, Sweden — We have carried out an analytic study of the entanglement scaling properties in the one-dimensional Hubbard model. We present exact scaling formulas for the local ("single-site") entanglement $\mathcal{E}$ at a quantum phase transition driven by a magnetic field or a chemical potential. The leading divergences of $d\mathcal{E}/dh$ and $d\mathcal{E}/d\mu$ are shown to be directly related to those of the zero-temperature spin and charge susceptibilities. Logarithmic corrections signal a change in the number of local states accessible to the system as it undergoes the transition. We show that the results for the leading divergences are generic, and follow from the scaling hypothesis that any local observable exhibits a singularity at a quantum phase transition. Illustrations from other strongly correlated electron systems are given, including the long-range Hubbard model in one dimension.

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