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Entanglement entropy near Kondo-destruction quantum critical points[1] KEVIN INGERSENT, University of Florida, JEDEDIAH PIXLEY, University of Maryland, CHRISTOPHER WAGNER, TATHAGATA CHOWDHURY, University of Florida, MATTHEW MIECNIKOWSKI, University of Colorado Boulder — We study the impurity entanglement entropy S_e in quantum impurity models that feature a Kondo-destruction quantum critical point (QCP) arising from a pseudogap in the conduction-band density of states and/or from an additional coupling of the impurity to a bosonic bath. On the local-moment (Kondo-destroyed) side of the QCP, the entanglement entropy contains a critical component that can be related to the order parameter characterizing the phase transition. In Kondo models describing a spin-S impurity, S_e assumes its maximal value $\ln(2S+1)$ at the QCP and throughout the Kondo phase, independent of particle-hole (a)symmetry and irrespective of whether the Kondo phase features exact, over-, or under-screening of the impurity spin. In Anderson models, by contast, S_e takes a nonuniversal value at the QCP. At particle-hole symmmetry, S_e rises monotonically on passage from the local-moment phase to the Kondo phase, while breaking this symmetry can lead to a cusp peak in S_e due to a divergent charge susceptibility at the QCP. Implications of these results for quantum-critical systems and quantum dots are discussed.

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