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Thermodynamical Properties across Quantum Critical Points JIANDA WU, LIJUN ZHU, QIMIAO SI — Quantum critical points (QCPs) are of extensive current interest, in part because they strongly influence the physical properties at finite temperatures. Thermodynamic properties have recently been used as a means to probe the energy scales in the quantum critical heavy fermion metals [1]. In addition, the divergence of the Gruneisen ratio (thermal expansion to specific heat) or its magnetic analog at any QCP, theoretically predicted a few years ago [2], has been observed in a growing list of quantum critical materials. In this work, we study the entropy as a function of control parameter in several theoretical models for quantum criticality. We explicitly demonstrate that the entropy is maximized near the QCP, which is compatible with the divergence of the Gruneisen ratio exactly at the QCP. When the control parameter is a magnetic field, we also study the field dependence of the isothermal magnetization and other magneto-thermal properties. [1] P. Gegenwart et al, Science 315, 969 (2007); [2] L. Zhu et al, PRL 91, 066404 (2003).

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