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A percolation description of the critical behavior in quantum critical Ce(Ru0.24Fe0.76)Ge2 TOM HEITMANN, JOHN GADDY, WOUTER MONTFROOIJ, University of Missouri — Quantum critical points (QCP) arise when the magnetic ordering of local moments that are embedding in a metallic system are just suppressed by Kondo shielding in the absence of thermal energy. Pure stoichiometric systems tend not to occur at QCPs so that an external tuning parameter is typically required to drive the system to the QCP. Often this external tuning parameter takes the form of chemical pressure by way of chemically substituting smaller (larger) ions at certain lattice positions such that the average interatomic spacing become smaller (larger). One unintended consequence of this approach, however, is the formation of a distribution of local interatomic—hence, also inter-moment—distances, which necessarily translates into a distribution of Kondo temperatures. In this case, the magnetic lattice fragments upon cooling such that percolation theory is necessary to describe the system, though—as we will demonstrate—certain modifications are required because of finite-size effects of the clusters. We argue that a complete QCP theory of heavily doped systems must begin by separating out the effects caused by the presence of magnetic clusters from those resulting from non-Fermi liquid behavior associated with the QCP.

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