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The disordered ground state of quantum critical $\text{Ce}(\text{Ru}_{1-x}\text{Fe}_x)_2\text{Ge}_2$ ¹ WOUTER MONTFROOIJ, JAGAT LAMSAL, University of Missouri, MEIGAN ARONSON, MARCUS BENNETT, University of Michigan, ANNE DE VISSER, HUANG YING KAI, NGUYEN THANH HUY, van der Waals-Zeeman Institute, MARK LUMSDEN, Oak Ridge National Laboratory, MOHANA YETHIRAJ, Bragg Institute ANSTO, YIMING QIU, National Institute of Standards and Technology — We present neutron scattering data that show that magnetic ordering in the vicinity of a quantum critical point is restricted to short length scales. Remarkably, the spatial extent of the magnetic correlations is independent of the inter-moment distances. We argue that our data on $\text{Ce}(\text{Ru}_{1-x}\text{Fe}_x)_2\text{Ge}_2$ demonstrate that quantum fluctuations disorder the system and dilute the magnetic moments to such an extent that the response of the system is disorder dominated. Our observations naturally explain how E/T- scaling is possible in systems whose apparent dimensionality is above the upper critical dimension.

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