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Bose Polarons Near Quantum Criticality

The emergence of quasiparticles in strongly interacting matter represents one of the cornerstones of modern physics. However, when different phases of matter compete near a quantum critical point, the very existence of quasiparticles comes under question. We create Bose polarons near quantum criticality by immersing atomic impurities in a Bose-Einstein condensate (BEC) with near-resonant interactions and probe their energy, spectral width, and short-range correlations as a function of temperature. We observe their inverse lifetime, given by their spectral width, to increase linearly with temperature at the Planckian scale $k_B T / \hbar$, a hallmark of quantum critical behavior.