Effect of disorder on quantum phase transition
in \((\text{Sr}_{1-x}\text{Ca}_x)_3\text{Ru}_2\text{O}_{7}\) Z. QU, J. PENG, T.J. LIU, D. FOBES, Tulane University, V. DOBROSAVLJEVIC, Florida State University, L. SPINU, Retired, Z.Q. MAO, Tulane University — \((\text{Sr}_{1-x}\text{Ca}_x)_3\text{Ru}_2\text{O}_{7}\) is characterized by complex magnetic states, spanning from antiferromagnetic state over an unusual heavy-mass nearly ferromagnetic (NFM) state to an itinerant metamagnetic state. The NFM state, which occurs in the \(0.4 > x > 0.08\) range, freezes into a cluster spin glass phase at low temperatures [1]. A quantum phase transition (QPT) occurs as the spin freezing temperature \(T_f\) is suppressed to zero K near \(x = 0.08\). In this talk, we will report a novel quantum phase observed near the QPT [2]. The isothermal magnetization \(M(H)\) and the temperature dependence of electronic specific heat \(C_e(T)\) of this phase exhibit anomalous power-law singularities and are controlled by a single exponent. Moreover, the magnetization \(M(T, H)\) of this phase is found to follow a phenomenological scaling law of \(M(H, T) \propto H^\alpha f(H/T^\delta)\). These observations indicate the slow dynamics in rare regions arising from the effect of disorder on the QPT.