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Quantum Fluctuations and Critical Behavior in $NiCl_2$-$4SC(NH_2)_2$[1] MARCELO JAIME, Y. KOHAMA, V. ZAPF, NHMFL, Los Alamos National Laboratory, Los Alamos, NM, USA, C.D. BATISTA, K. ALHASSANIEH, Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM, USA, P. SENGUPTA, DPAP, Nanyang Technological University, Singapore, N. DILLEY, Quantum Design, San Diego, CA, USA, A. PADUAN-FILHO, Instituto de Fisica, Universidade de São Paulo, Brazil — $NiCl_2$-$4SC(NH_2)_2$ is a anisotropic S = 1 system of Ni^{2+} spins on a tetragonal lattice, that shows XY-type magnetic field-induced magnetic order below 1K. Here we report specific heat Cp(H) and magnetization M(H) vs field measurements on single crystal samples of this compound across the (H,T) phase boundaries. The specific heat shows a remarkable asymmetry for critical fields H_{c1} and H_{c2}, against the expected particle-hole symmetry implicit in a hard-core boson approximation, pointing to strong quantum fluctuations effect. Our analysis of critical behavior in the magnetization at the (Hc1, Mc) phase boundary leads to the conclusion that the $U(1)$ symmetry is preserved, a characteristic of the Bose-Einstein condensation universality. Our Quantum Monte Carlo simulations reproduce the experimental data exceedingly well.

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