Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Thermal Conductivity and the Boson Mass in the Bose-Einstein Condensate compound $NiCl_2$-4SC(NH_2)$_2$ V.S. ZAPF, M. JAIME, C.D. BATISTA, K.A. ALHASSANIEH, Los Alamos National Lab, P. SENGUPTA, Nanyang Technological University, Singapore, A. SOLOGUBENKO, II Physikalisches Institut, Univ. Cologne, Germany, J. MYDOSH, Kamerlingh Onnes Lab. Leiden Univ., The Netherlands, H. VIEYRA, N. OESCHLER, F. STEGLICH, Max Plank Institute for Chemical Physics, Dresden, Germany, A. PADUAN-FILHO, Departmenta de Fisica, Universidade de Sao Paulo, Brazil — The quantum magnet $NiCl_2$-4SC(NH_2)$_2$ has been shown to exhibit Bose-Einstein Condensation (BEC) of the Ni S = 1 spin system. This compound exhibits field-induced XY antiferromagnetism for magnetic fields along the tetragonal c-axis between H_{c1} = 2.1 and H_{c2} = 12.6 T, and the axial symmetry of the spin environment allows us to understand the quantum phase transitions at H_{c1} and H_{c2} in terms of Bose-Einstein condensation (BEC) of spins. Here the tuning parameter for BEC transition is the magnetic field and not the temperature. It turns out that mass of the bosons that condense can be strongly suppressed by quantum fluctuations, and this effect occurs disproportionately at H_{c1}. Here we present new thermal conductivity and specific heat data to probe the effect of quantum fluctuations on the boson mass. We compare the experimental results to quantum Monte Carlo simulations and an effective low-energy theory.

Vivien Zapf
Los Alamos National LAb

Date submitted: 01 Dec 2009 Electronic form version 1.4