

MAR11-2010-001874

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

Bose-Einstein Condensation and Asymmetry induced by Quantum Fluctuations in $\text{NiCl}_2\text{-4SC}(\text{NH}_2)_2$ ¹

VIVIEN ZAPF, National High Magnetic Field Lab, Los Alamos National Lab

I will review Bose-Einstein condensation (BEC) in quantum magnets, in particular the compound $\text{NiCl}_2\text{-4SC}(\text{NH}_2)_2$. This compound exhibits field-induced XY antiferromagnetism of the $S = 1$ Ni system 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 BEC of the spin system. Here the tuning parameter for the 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, resulting in a remarkable asymmetry between the properties at H_{c1} and H_{c2} . Here I will present magnetization, thermal conductivity and specific heat data to probe BEC and in particular the effect of quantum fluctuations on the boson mass.

¹We acknowledge the National Science Foundation, US Dept of Energy and the state of Florida, as well as the LANL LDRD program and the Brazilian agency CNPq.