Investigation of the magnetic susceptibility of the disordered BEC system NiCl$_{0.85}$Br$_{0.15}$-4SC(NH$_2$)$_2$ at ultralow-temperatures LIANG YIN, CHAO HUAN, JIAN-SHEN XIA, NEIL SULLIVAN, University of Florida, VIVIEN ZAPF, LANL, ARMANDO PADUAN-FILHO, Universidade de Sao Paulo, RONG YU, Rice University, TOMMASO ROSCILDE, ENS Lyon — We report measurements of the magnetic susceptibility of a disordered BEC system of magnons for single crystals of NiCl$_{0.85}$Br$_{0.15}$-4SC(NH$_2$)$_2$ (with 15% Cl atoms replaced by Br). NiCl$_{0.85}$Br$_{0.15}$-4SC(NH$_2$)$_2$ is a potential candidate for a Bose glass (BG) phase of the spins adjacent to a region of Bose-Einstein condensation (BEC). The BG to BEC phase is the bosonic analog of a metal-insulator transition for fermions. The measurements were carried out for temperatures down to 1mK and for applied magnetic fields up to 14.5T. The results show that the critical fields $H_c$ do not obey the conventional 3D universality class for a BEC, $H_c(T) - H_c(0) \sim T^\alpha$, where $\alpha = 1.5$ [1]. The values of $\alpha$ changes from $\alpha = 0.52$ for $T > 300$ mK to $\alpha = 0.91$ for $T < 250$ mK and then again at 70$\sim$90mK to $\alpha = 0.48$ for $T< 70$ mK, indicating a crossover to possible BG behavior.

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