Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

**Effect of chemical substitution on quantum spin ladders** TAO HONG, ANDREY ZHELUDEV, Oak Ridge National Laboratory, HIROTAKA MANAKA, Kagoshima University, YIMING QIU, National Institute of Standards and Technology — Unlike in any other quantum spin ladder system, the magnitude of the spin gap in IPA-$CuCl_3$ [1] can be tuned by chemical doping. We describe inelastic neutron scattering measurements on powder samples of IPA-Cu($Br_xCl_{1-x}$)$_3$ for a different values of x. Br-doping directly affects the key interactions involving Cu-Cl-Cl-Cu superexchange pathway and induces bond randomness [2]. In the pure system the spin gap is readily visible. At 3% and 7% Br-doping, the gap models are weakened and presumably broadened, while additional scattering emerges at low energies. The gap excitations totally disappear by x=10%. [1] T. Masuda, A. Zheludev, H. Manaka, L.-P. Regnault, J.-H. Chung, Y. Qiu, Phys. Rev. Lett. 96, 047210 (2006). [2] H. Manaka, I. Yamada, H. Mitamura and T. Goto, Phys. Rev. B **66**, 064402 (2002); H. Manaka *et al.*, Phys. Rev. Lett. **101**, 077204 (2008).

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Date submitted: 19 Nov 2008 Electronic form version 1.4