Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Magnetic susceptibilities of rectangular Heisenberg S=1/2 antiferromagnets TOM VALLEAU, ROB BUTCHER, BRIAN KEITH, CHRISTOPHER LANDEE, MARK TURNBULL, Clark University, ANDERS SANDVIK, Boston University — Rectangular antiferromagnets are two-dimensional systems with inequivalent exchange strengths (J', J) along the two principle axes with J' $\equiv \alpha$J, α <1. They have an intermediate dimensionality that can vary continuously from 1D ($\alpha = 0$) to square 2D ($\alpha = 1$). There exist a number of physical realizations of rectangular antiferromagnets ($CuPzBr_2$, $CuPzCl_2$, $CuPz(N_3)_2$ where Pz = pyrazine) but there has been no previous mechanism for interpreting their susceptibilities in terms of two exchange parameters. We have simulated the susceptibility of the rectangular S=1/2 Heisenberg antiferromagnet using the stochastic series expansion quantum Monte Carlo method [1] and used the results to interpret our experimental data. For example, copper pyrazine diazide, $CuPz(N_3)_2$, has a primary exchange of 15.5 K and an anisotropy parameter $\alpha = 0.4$. The stronger exchange is due to the superexchange pathway through the pyrazine molecule and the weaker corresponds to the azide bridges. [1] A. Sandvik, PRB 59, R14157 (1999).

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Date submitted: 22 Nov 2007 Electronic form version 1.4