Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Non-linear spin wave theory results for the frustrated S = 1/2 Heisenberg antiferromagnet on a body-centered cubic and simple cubic lattice TRINANJAN DATTA, Augusta State University, KINGSHUK MAJUMDAR, Grand Valley State University — Using non-linear spin wave theory at zero temperature we compute the sublattice magnetization and the ground state energy of the quantum spin-1/2 Heisenberg antiferromagnet on a body-centered cubic (BCC) lattice and a simple cubic (SC) lattice with competing first and second neighbor exchange interactions (J1 and J2). For both the BCC and the SC lattice we find the existence of a two sublattice Neel phase (AF) for small J2 and a collinear phase at large J2 (CAF). For the BCC lattice it is found that up to quartic corrections the first order phase transition, predicted from linear spin wave theory, between the AF and the CAF survives and occurs at the critical transition point, J2/J1 = 0.67. For the SC lattice linear spin wave theory predicts an intermediate paramagnetic phase. However, with the inclusion of the non-linear corrections the intermediate paramagnetic phase disappears. The first order phase transition from the AF-phase to the CAF-phase occurs at the critical transition point, J2/J1 = 0.28.

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Date submitted: 18 Nov 2009 Electronic form version 1.4