Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Effect of Zn doping on the phase transition temperatures of $Ni_3V_2O_8$ AKILA KUMARASIRI, PARASHU KHAREL, AMBESH DIXIT, GAVIN LAWES, Department of Physics and Astronomy, Wayne State University, Detroit, MI 48201 — There is a considerable interest in understanding the nature of magnetic phase transition in geometrically frustrated materials. $Ni_3V_2O_8$ is one such system, with spin-1 Ni^{2+} ions forming a layered buckled Kagome structure. We have studied the effects of doping spin-0 Zn ions on the magnetic phase transitions of powder $Ni_3V_2O_8$ using dielectric and heat capacity measurements. $(Ni_{1-x}Zn_x)_3V_2O_8$ powder samples were synthesized starting with a mixture of Ni, V and Zn metal organic solutions mixed at appropriate atomic ratio. XRD and Raman studies show that $(Ni_{1-x}Zn_x)_3V_2O_8$ powder samples annealed at 1000°C crystallize in $Ni_3V_2O_8$ structure without forming any secondary phases. We have observed from heat capacity measurements that the phase transitions T_H, T_L, and T_C at 9.2K, 6.4K, and 3.9K expected for $Ni_3V_2O_8$ are present in our $(Ni_{1-x}Zn_x)_3V_2O_8$ samples up to a Zn concentration of 20%. The transition at 2.4 K was not clearly observed. All three transitions shift toward lower temperatures with an increase in Zn concentration. We will present the experimental results on the strong suppression of both T_H and T_L due to dilution of $Ni_3V_2O_8$ with non-magnetic Zn. Furthermore, we will present a quantitative comparison of this suppression with the 2D Ising and Heisenberg models.

Akila Kumarasiri
Department of Physics and Astronomy,
Wayne State University, Detroit, MI 48201

Date submitted: 18 Nov 2008 Electronic form version 1.4