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Magnetic Correlations in a Frustrated Ni^{3+} - Based Spin 1/2 Honeycomb Lattice KATE ROSS, Institute for Quantum Matter, Johns Hopkins University, NIST Center for Neutron Research, JOHN ROUDEBUSH, Institute for Quantum Matter, Princeton University, DANIEL PAJEROWSKI, CRAIG BROWN, JOSE RODRIGUEZ, NIST Center for Neutron Research, COLLIN BROHOLM, Institute for Quantum Matter, Johns Hopkins University, NIST Center for Neutron Research, ROBERT CAVA, Institute for Quantum Matter, Princeton University — We have studied the magnetic properties, via thermodynamic probes and inelastic neutron scattering, of the new spin-1/2 honeycomb material $Na_{0.95}Ni_2SbO_6 \cdot 1.5D_2O$ [1]. This hydrated compound hosts well separated honeycomb layers of nickel ions in the unusual Ni^{3+} oxidation state, which produces S=1/2 magnetic moments. While a Curie-Weiss temperature of -13K indicates overall antiferromagnetic interactions, specific heat and neutron scattering reveal the presence of ferromagnetic correlations with coherent spin excitations that build up gradually upon cooling below 10K. No transition to long range order is observed down to 2 K, as evidenced by specific heat and neutron scattering, although AC susceptibility measurements indicate a dramatic change in dynamics near 4.2K. The results indicate the presence of frustration arising from competing interactions between ions in the layers. This compound, along with potential isostructural analogs, opens a new route to study the phase diagram of spin 1/2 honeycomb lattice models with competing interactions.

[1] J.H. Roudebush and R.J. Cava. J. Solid State Chem, 204. 178-185 (2013)

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