Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Magnetic structures of the anisotropic Dirac metals $AMnBi_2$ (A = Ca, Sr) YANFENG GUO, ANDREW PRINCEP, Department of Physics, University of Oxford, Clarendon Laboratory, PASCAL MANUEL, DIMITRY KHALYAVIN, ISIS Facility, Rutherford Appleton, ANDREW BOOTHROYD, Department of Physics, University of Oxford, Clarendon Laboratory, X-RAY AND NEUTRON SCATTERING GROUP TEAM, ISIS FACILITY COLLABORATION — Magnetism is potentially important in the Dirac materials $AMnBi_2$ (A = Sr and Ca) because long-range magnetic order of the Mn spins provides an additional periodic potential that could influence the Fermi surface and hence the behavior of the Dirac fermions. We report powder and single crystal neutron diffacraction measurements of the magnetic order in $AMnBi_2$ (A = Sr and Ca), two layered manganese pnictides with anisotropic Dirac fermions on a Bi square net. Both compounds are found to order in k = 0 antiferromagnetic structures, with ordered Mn moments at T = 10 K of approximately 3.8 μ_B aligned along the c axis. The magnetic structures are Néel-type within the Mn-Bi layers, consistent with density functional theory predictions, but the interlayer ordering is different in the two materials, being antiferromagnetic in $SrMnBi_2$ and ferromagnetic in $CaMnBi_2$. This allows a mean-field coupling of the magnetic order to the Dirac fermions in $CaMnBi_2$, but not in $SrMnBi_2$.

Yanfeng Guo
Department of Physics, University of Oxford, Clarendon Laboratory

Date submitted: 14 Nov 2013 Electronic form version 1.4