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Interplay between magnetism and relativistic fermions in Eu doped (Sr/Ba)$MnSb_2$ JINYU LIU, JIN HU, YANGLIN ZHU, ALYSSA CHUANG, Tulane University, DAVID GRAF, National High Magnetic Field Lab, MARCELO JAIME, FEDOR BALAKIREV, FRANZISKA WEICKERT, National High Magnetic Field Laboratory, Los Alamos National Laboratory, QIANG ZHANG, JOHN DITUSA, Louisiana State University, YAN WU, HUIBO CAO, Oak Ridge National Laboratory, ZHIQIANG MAO, Tulane University — Layered compounds $AMnBi_2$ (A=Ca, Sr, Ba, Eu, and Yb) have been established as Dirac materials with fascinating properties. In our previous work, we have demonstrated that $Sr_{1-y}Mn_{1-z}Sb_2$ (y, z <0.1), isostructural to $AMnBi_2$, not only host relativistic fermions, but also exhibit ferromagnetic properties, with its ferromagnetism being coupled to the relativistic fermions' transport. To gain further insight into the relativistic fermion-magnetism coupling, we have synthesized a series of Eu doped (Sr/Ba)$MnSb_2$ single crystals and found Eu moments order antiferromagnetically. Through neutron scattering experiments, we determined the magnetic structures for $Sr_{1-x}Eu_xMnSb_2$ with x = 0.2, 0.5, and 0.8. From magnetotransport measurements, we find the Eu antiferromagnetism is also coupled to relativistic fermion transport. More importantly, we observed a novel quantum phase with saturated magnetoresistivity near the quantum limit for the 10% Eu doped $BaMnSb_2$ sample. We will discuss possible mechanisms for this novel phase.

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