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Unconventional electronic state in half-frustrated $Ca_2Os_2O_7$ MAREIN RAHN, ROGER JOHNSON, University of Oxford, JAMES VALE, CHRISTIAN DONNERER, University College London, PASCAL MANUEL, DMITRY KHALYAVIN, ISIS Facility, GARETH NISBET, DIAMOND Light Source, DESMOND MCMORROW, University College London, ANDREW BOOTHROYD, University of Oxford — In 5d transition metal oxides (5d TMOs), the combination of strong spin-orbit coupling and electronic correlation can lead to unusual ground states. Orthorhombic calcium osmate is a "half frustrated" compound with a strange phase transition at 327 K, enhancing its resistivity by an order of magnitude. We have investigated the concomitant magnetic ordering process by neutron powder diffraction and single crystal resonant x-ray diffraction. Our results reveal a complex reordering process, likely induced by magnetic frustration. Similar coupling of magnetic order and electronic transport has been in observed in other families of 5d TMOs. Given the itinerant character of these materials, one cannot explained such behaviour in a Mott-Hubbard scenario. We hope that $Ca_2Os_2O_7$ will serve as a model system to help understand this peculiar interplay of spin-orbit coupling, correlation and frustration.

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