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Field-induced antiferromagnetic order in $Sr_3Ru_2O_7$ CHRISTOPHER LESTER, STEPHEN HAYDEN, University of Bristol, UK, SILVIA RAMOS, University of Kent, UK, ROBIN PERRY, UCL, UK, THOMAS CROFT, University of Bristol, UK, ROBERT BEWLEY, TATIANA GUIDI, PASCAL MANUEL, DMITRY KHALYAVIN, ISIS Neutron Source, UK — Many novel electronic ground states form in close proximity to quantum critical points, that is, the point where a continuous phase transition occurs at zero temperature. By suppressing the metamagnetic transition in $Sr_3Ru_2O_7$ to low temperatures via the application of a magnetic field, the system is driven into a 'nematic' phase. This phase occurs at temperatures below approximately 1 K and at fields $\mu_0 H_c \approx 8$ T. The phase is often described as nematic since transport properties display pronounced anisotropic tendencies which are not present in the underlying crystal lattice. Using elastic neutron scattering we have found evidence for two adjacent magnetically ordered phases near $\mu_0 H_c$ in this material. The period of the order in both phases is incommensurate with the underlying lattice and most likely determined by the electronic band structure. The presence of static antiferromagnetic order provides a very natural explanation for the anisotropic transport properties that have been observed in this system. Our observation of field-induced antiferromagnetic order in a clean metal provides valuable insights into the physics of novel phase formation near quantum critical points.

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