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Field-induced nematic-like magnetic transition in an iron pnictide superconductor, $\mathbf{Ca_{10}(Pt_3As_8)((Fe_{1-x}Pt_x)_2As_2)_5}$ MATTHEW WATSON, AMALIA COLDEA, SAM BLAKE, Clarendon Laboratory, University of Oxford, UK, ALIX MCCOLLAM, High Field Magnet Laboratory, Radboud University, Nijmegen, The Netherlands, DAVID VIGNOLLES, LOIC DRIGO, Laboratoire National des Champs Magnétiques Intenses, Toulouse, France, IGOR MAZIN, Naval Research Laboratory, Washington, D.C., USA, DANIEL GUTERDING, HARALD JESCHKE, ROSER VALENTI, Institut für Theoretische Physik, Goethe-Universität Frankfurt, Germany, NI NI, Department of Physics and Astronomy, University of California, Los Angeles, ROBERT CAVA, Department of Chemistry, Princeton University, Princeton — We report a high magnetic field study up to 55 T of the nearly optimally doped iron-pnictide superconductor $Ca_{10}(Pt_3As_8)((Fe_{1-x}Pt_x)_2As_2)_5$ with a $T_c \approx 10$ K using magnetic torque, tunnel diode oscillator technique and transport measurements. We determine the superconducting phase diagram, revealing an anisotropy of the irreversibility field up to a factor of 10 near T_c and signatures of multiband superconductivity. Unexpectedly, we find a spin-flop like anomaly in magnetic torque at 22 T, when the magnetic field is applied perpendicular to the *ab* planes, which becomes significantly more pronounced as the temperature is lowered 0.33 K. As our superconducting sample lies well outside the antiferromagnetic region of the phase diagram, the observed field-induced transition in torque indicates a spin-flop transition *not of long-range ordered moments*, but of nematic antiferromagnetic fluctuations. This work was supported by the EPSRC (EP/I004475/1) and EuroMagNET II.

Matthew Watson
Clarendon Laboratory, University of Oxford, UK

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