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Unusual behavior of uranium dioxide at high magnetic fields. Part I[1] K. GOFRYK, Idaho National Laboratory, M. JAIME, V. ZAPF, N. HARRISON, Los Alamos National Laboratory, A. SAUL, Aix-Marseille University, France , G. RADTKE, University of Paris 06, CNRS, France, J. C. LASHLEY, Los Alamos National Laboratory, M. SALAMON, University of Texas, Dallas, A. D. ANDERSSON, C. STANEK, T. DURAKIEWICZ, J. L. SMITH, Los Alamos National Laboratory — UO_2 is a Mott-Hubbard insulator with well-localized $5f$-electrons and its crystal structure is the face-centered-cubic fluorite. It experiences a first-order antiferromagnetic phase transition at 30.8 K to a non-collinear antiferromagnetic structure that remains a topic of debate. It is believed that the first order nature of the transition results from the competition between the exchange interaction and the Jahn-Teller distortion of oxygen atoms. Despite extensive experimental and theoretical efforts the nature of the competing degrees of freedom and their couplings (such as spin-phonon coupling) are still unclear. Here we present results of our extensive thermodynamic investigations, on well-characterized and oriented single crystals of UO_2, focusing on magnetization M(T,H) measurements in DC and pulsed magnetic fields to up 65 T at the NHMFL.

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Krzysztof Gofryk
Idaho National Laboratory

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