Abstract Submitted
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High Pressure Low Temperature X-Ray Diffraction Studies of UO2 and UN single crystals.[1] DANIEL ANTONIO, Idaho National Laboratory, DANIEL MAST, BARBARA LAVINA, University of Nevada, Las Vegas, KRZYSZTOF GOFRYK, Idaho National Laboratory — Uranium dioxide is the most commonly used nuclear fuel material in commercial reactors, while uranium nitride also has many thermal and physical properties that make it attractive for potential use in reactors. Both have a cubic fcc lattice structure at ambient conditions and transition to antiferromagnetic order at low temperature. UO2 is a Mott insulator that orders in a complex non-collinear 3k magnetic structure at about 30 K, while UN has appreciable conductivity and orders in a simpler 1k magnetic structure below 52 K. Both compounds are characterized by strong magneto-structural interactions, understanding of which is vital for modeling their thermo-physical properties. While UO2 and UN have been extensively studied at and above room temperature, little work has been done to directly study the structure of these materials at low temperatures where magnetic interactions are dominant. In the course of our systematic studies on magneto vibrational behavior of UO2 and UN, here we present our recent results of high pressure X-Ray Diffraction (up to 35 GPa) measured below the Neel temperature using synchrotron radiation.

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