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B vs. T phase diagram of $(ND_4)_2[FeCl_5(D_2O)]$ studied by neutron diffraction and magnetization[1] WEI TIAN, HUIBO CAO, JIAQIANG YAN, Oak Ridge National Laboratory, AMANDA CLUNE, KENDALL HUGHEY, University of Tennessee, JOHN SINGLETON, Los Alamos National Laboratory, JANICE MUSFELDT, University of Tennessee, BRIAN SALES, JAIME FERNANDEZ-BACA, Oak Ridge National Laboratory — $(NH_4)_2[FeCl_5(H_2O)]$ was recently discovered to exhibit magnetically induced multiferroicity with a rich magnetic field versus temperature (B vs. T) phase diagram. In a previous zero-field study we reported the coexistence of both incommensurate and commensurate "electronic soft" phases in $(NH_4)_2[FeCl_5(H_2O)]$ due to strong magnetic frustration and spin-lattice coupling. Here we report neutron diffraction and magnetization studies under applied magnetic field on deuterated $(ND_4)_2[FeCl_5(D_2O)]$ single crystals. Our measurements show that the presence of the coexistence of competing phases has profound effects to the macroscopic properties of this molecular compound. Our results reveal new novel phases in the B vs. T phase diagram of $(NH_4)_2[FeCl_5(H_2O)]$.

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