**Systematic Pressure Control of Dimensionality in Cs2CuBr4**

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**Introduction**

Cs2CuBr4 is a triangular lattice antiferromagnet of S=1/2 Cu2+ ions. It develops long range magnetic order at TN=1.4 K. The inplane exchange interactions are strongly anisotropic due to the loss of 3-fold symmetry in the triangular plane. The crystal shows a plethora of magnetic phases in external field that is yet to be understand theoretically [1]. We applied pressure to tune the spin Hamiltonian towards a more isotropic triangular lattice by slightly distorting the crystal structure and to see how the magnetic phase diagram changes.

**Experimental**

We used the 35 T magnet (Cell 12) with top loading cryostat (32 mm bore) to measure the magnetization of Cs2CuBr4 as a function of magnetic field and pressure. We used the tunnel diode oscillator to detect the magnetization, the pressure was applied using the piston cylinder cell and the low temperature was provided by a He-3 cryostat. To make the magnetization signal more pronounced we measured at the lowest possible temperature which was between 300 mK and 500 mK for different runs as it turned out that it is not possible to consistently reach the same temperature after each pressure change. We applied 3.7, 8.7, 10.2 and 17.5 kbar consecutively, covering the possible pressure range of the cell.

**Results and Discussion**

The magnetization signal was dominated by a smooth background that is dependent on the sample loading. To compare the magnetization of the different pressures, it is easier to compare the derivative the magnetization as a function of external field. The results are shown in **Fig.1**. The peaks in the derivative define transitions between different magnetic phases. The most prominent transition is at 30 T at 3.7 kbar. This corresponds to the saturation field HS (28.5 T at ambient pressure [1]). The saturation field increases with increasing pressure as one would expect, which reflects the general increase of the exchange couplings in the compressed crystal as a function of pressure. Moreover, several new magnetic transition becomes visible with increasing pressure. The new transitions reveal that the magnetic phase diagram is sensitive to pressure. Surprisingly the 1/3 magnetization plateau disappears already at 3.7 kbar pressure. To determine the nature of the different phase further studies are necessary.

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**References**

[1] N. Fortune, *et al.*, Phys. Rev. Lett. **102**, 257201 (2009).



**Fig.1** Field derivative of the magnetization of Cs2CuBr4 measured at different pressures. Red and blue lines correspond to up and down field sweeps respectively.