

The 5K Anomaly in the Triangular Lattice Mott Insulator

κ -(BEDT-TTF)₂Cu₂(CN)₃

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The quasi-two-dimensional Mott insulator with triangular lattice, κ -(BEDT-TTF)₂Cu₂(CN)₃, exhibits no long range magnetic ordering down to 32mK under ambient pressure due to the strong frustration (hereafter we call this magnetically frustrating phase a “spin liquid” phase) [1]. The spin liquid state is persistent up to the critical pressure of the Mott transition [2-4]. Interestingly, ¹H-, ¹³C-NMR [1,5], heat capacity [6] and heat conductivity [7] shows anomalies around 5K. The ¹³C-NMR characteristics indicate the development of a field-induced inhomogeneity below 5K.

To see the pressure dependence of the 5K anomaly in the spin liquid phase toward the Mott transition, we performed resistance and ¹³C-NMR measurements under pressure controlled precisely by a ⁴He gas hydrostatic pressure system. We confirmed the absence of magnetic order and observed the persistence of the 5K anomaly up to the pressure-induced Mott transition. It is noteworthy that a subtle re-entrant Mott transition is observed around 5K in the resistance measurements. The pressure-temperature (*P-T*) phase diagram is shown in Fig.1. The apparent coincidence of the anomaly in the spin liquid and the sign reversal of the Mott boundary slope suggests that the anomaly has something to do with some release of spin entropy different from magnetic order.

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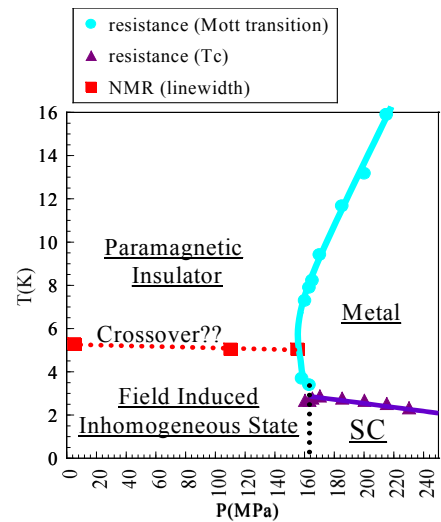


Fig.1 *P-T* phase diagram of κ -(BEDT-TTF)₂Cu₂(CN)₃