Low-Temperature Heat Capacities of the Quantum Spin Liquid States in Organic Mott Insulators


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Quantum spin-liquid states were great interested due to their peculiar quantum characters and the relation to high-$T_c$ superconductivity. In the organic Mott insulators $\kappa$-(ET)$_2$Cu$_2$(CN)$_3$ and EtMe$_3$Sb[Pd(dmit)$_2$]$_2$, the NMR and magnetic studies did not detect any long-range ordering and spin glass behavior [1,2]. Our previous works reported the evidence realization of the quantum spin liquid state with the gapless excitation and unexpected thermal anomalies in these materials [3].

In this work, we have performed heat capacity measurements for $d_8$-EtMe$_3$Sb[Pd(dmit)$_2$]$_2$ and $\kappa$-(d$_8$:ET)$_2$Cu$_2$(CN)$_3$ at low temperatures in order to investigate the influence of chemical pressures in quantum spin-liquid states. As a result, we found the significant change of the heat capacity due to the chemical pressure in EtMe$_3$Sb[Pd(dmit)$_2$]$_2$. This fact suggests the sensitivity of the quantum spin liquid state in the Pd(dmit)$_2$ system.