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Frustration dependence of elementary excitation in a quantum spin liquid M. YAMASHITA, K. UEDA, H. CUI, R. KATO, Riken, H.M. YAMAMOTO, Institute for Molecular Science, T. FUKUNAGA, Tokyo Univ. of Science, T. TERASHIMA, S. UJI, NIMS — A quantum spin liquid state (QSL) with a magnetic gapless excitation has been found in the organic Mott insulator $EtMe_3Sb[Pd(dmit)_2]_2$ with nearly identical 2D triangular lattices of $S = 1/2$ [1]. To examine the nature of the QSL, it is essential to determine the phase diagram, especially how the gapless QSL evolves when the degree of frustration is changed. Although the gapless QSL is shown to be robust against deuteration of the cation $EtMe_3Sb$ [1], the difference of frustration caused by the deuteration is not clear. We study the frustration dependence of the elementary excitation in the mixed-cation materials $(Me_4Sb)_{1-x}(EtMe_3Sb)_x[Pd(dmit)_2]_2$ in which the degree of frustration is directly reduced by mixing the smaller cation. Magnetic torque measurements showed that spin susceptibilities of the mixed cation ($x = 0.32$ and 0.35) were temperature independent down to 30 mK and were almost the same with that of $x = 1$, indicating that the QSL exists as a quantum critical phase, rather than a point, when the frustration is varied. We will also present magnetic torque and thermal transport measurements of mixed-cation materials with different x.

[1] D. Watanabe *et al.*, Nat. commun. **3**, 1090 (2012).

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