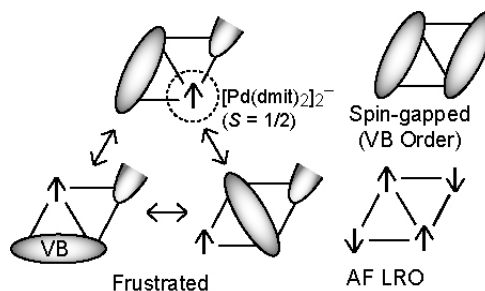


Frustrated Quantum Antiferromagnets, [Pd(dmit)₂]₂ Salts

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A series of the [Pd(dmit)₂]₂ salts provide triangular antiferromagnets, in which the $S = 1/2$ Heisenberg spins localized on the dimeric units [Pd(dmit)₂]₂⁻ are frustrated [1]. Among them, the EtMe₃Sb salt has been found to behave as a gapless spin liquid at low temperature [2]. In the monoclinic EtMe₃P salt, spin-gapped phase appears below 25 K accompanied by spontaneous breaking of lattice translational symmetry, indicating the spatially ordered spin-singlet pairs (valence bonds, VB's) [3]. Suppression of the VB ordering by pressure affords superconductivity [4,5]. Some other salts with larger spatial anisotropy undergo antiferromagnetic long-range ordering (AF LRO). Crossover from a frustrated paramagnetic state to an antiferromagnetically correlated state is observed slightly above the transition temperature, due to the low-lying short-range spin excitations. These features can be explained in terms of the ordering, resonance and flipping of the VB's, manifesting quantum liquid nature of the frustrated spins on a two-dimensional triangular lattice.



[1] M. Tamura, R. Kato, *J. Phys.:Condens. Matter* **14** (2002) L729

[2] T. Itou et al., *J. Phys.:Condens. Matter* **19** (2007) 145274

[3] M. Tamura, A. Nakao, R. Kato, *J. Phys. Soc. Jpn.* **75** (2006) 093701

[4] Y. Ishii, M. Tamura, R. Kato, *J. Phys. Soc. Jpn.* **76** (2007) 033704

[5] R. Kato, A. Tajima, A. Nakao, M. Tamura, *J. Am. Chem. Soc.* **128** (2006) 10016