Emergence of superconductivity, valence bond order, and Mott insulator in Pd[dmit]_2 based organic salts

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The triangular Z[Pd(dmit)_2]_2 salts where Z is a monovalent caption have provided fascinating examples for the rich physics in frustrated and strongly correlated materials.
Among them, Z=EtMe3P shows no indication of antiferromagnetic order, but a high temperature paramagnetic insulator turns to a spin gapped insulator with columnar valence bond order at low temperatures.
Under pressure, the EtMe3P slats exhibit superconductivity with maximum Tc appearing at the border of valence bond order suggesting a close connection between the two phases.
We provide a microscopic model on triangular lattice which captures the interplay between spin liquid, valence bond order, superconducting, and metallic phases within a single theoretical framework.

The complexity observed in the EtMe3P salts will be also discussed in the context of our theoretical results.