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Magnetic effects of non-magnetic impurities in gapped short-range resonating valence bond spin liquids

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We study the effect of a small density n_v of quenched non-magnetic impurities, {\em i.e.} vacancy disorder, in gapped short-range resonating valence
bond (RVB) spin liquid states and valence bond solid (VBS) states of quantum magnets. We argue that a large class of short-range RVB liquids are stable at
small n_v on the kagome lattice, while the corresponding states on triangular, square, and honeycomb lattices are unstable at any nonzero n_v due to
the presence of emergent vacancy-induced local moments.
In contrast, VBS states are argued to be generically unstable (independent of lattice geometry) at nonzero n_v due to such a local-moment instability. Our
arguments rely in part on an analysis of the statistical mechanics of maximally-packed dimer covers of the diluted lattice, and are fully supported by our
computational results on $O(N)$ symmetric designer Hamiltonians.

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