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Valence bond orders in spin-1/2 antiferromagnets in three dimensions OLEXEI MOTRUNICH, KITP, T. SENTHIL, MIT — We discuss possible valence bond orders in spin-1/2 quantum antiferromagnets on a 3D cubic lattice and expose their relation to a possible fractionalized Coulomb spin liquid state in the vicinity of the collinear Neel order. The analysis is an extension to (3+1)D of techniques previously developed in two spatial dimensions. In three dimensions, the identification of such confining phases with broken translational symmetry is formulated as a problem of monopole condensation patterns for monopoles hopping on the dual lattice and accumulating nontrivial Berry phases specific for the spin-1/2 system. Columnar and "box" valence bond states appear as natural candidates.

Olexei Motrunich
KITP

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