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Order in the resonating singlet valence plaquette model in three dimensions. SERGEY PANKOV, LPT-ENS, Paris, FRANCE, RODERICH MOESSNER, LPT-ENS, Paris, FRANCE, SHIVAJI SONDHI, Department of Physics, Princeton, NJ — We study a generalization of resonating valence bond (RVB) physics to three dimensions. In two dimensions short-range RVB models can exhibit fundamentally interesting phenomena like quantum liquid states with topological order and fractionalization. Whereas in the RVB case, the basic degree of freedom can be thought of as an $SU(2)$ singlet (valence) bond between two spins, in resonating singlet valence plaquette (RSVP) physics, it corresponds to an $SU(4)$ singlet comprising four sites; this might arise for example in a spin-orbital model. Here, we discuss the detailed phase diagram for the simplest case – the Rokhsar-Kivelson RSVP model on the cubic lattice.

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