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Linear independence of nearest neighbor valence bond states on several 2D lattices[1] JULIA WILDEBOER, ALEXANDER SEIDEL, Washington University in St. Louis — We show for several two-dimensional lattices that the spin-1/2 nearest neighbor valence bond states are linearly independent. To do so, we utilize and further develop a method recently introduced [1] for the kagome lattice. This method relies on the identification of an appropriate cell for the respective lattice, for which a certain local linear independence property can be demonstrated. Whenever this can be achieved, linear independence follows for arbitrarily large lattices that can be covered by such cells, for open or periodic boundary conditions. We report that this method is applicable to a number of 2D lattices including the kagome, honeycomb, square, pentagonal I and II, and the star lattice. Applications of general linear independence properties, such as the derivation of effective quantum dimer models, are discussed. Furthermore, motivated by a spin-1/2 Hamiltonian on the kagome lattice that has Anderson's resonating-valence-bond (RVB) spin liquid wave function(s) as ground state(s) [1], we mention possibilities to study the properties of this RVB wave function for the kagome and other frustrated lattices using Monte Carlo techniques. [1] A. Seidel, Phys. Rev. B **80,** 165131 (2009).

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