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Spin Liquids, Valence Bond Crystals and Cantor Deconfinement in Quantum Dimer Models

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Quantum dimer models capture the low energy dynamics of valence bond phases of quantum magnets. I will review results on their phase diagrams on a variety of lattices in two and three dimensions. These exhibit Z_2 and $U(1)$ resonating valence bond liquids, a variety of valence bond crystals and a region with a devil's staircase of commensurate and incommensurate crystals which support deconfinement of spinons on a Cantor set. I will also describe the construction of $S = 1/2$ Heisenberg Hamiltonians which precisely reproduce these phase diagrams.