Neel to valence-bond solid transitions in generalized amplitude-product states with correlated weights[1] YU-CHENG LIN, Graduate Institute of Applied Physics, National Chengchi University, Taiwan, JIE LOU, Institute for Solid State Physics, ISSP, University of Tokyo, Japan, YING TANG, ANDERS SANDVIK, Department of Physics, Boston University, USA — An amplitude-product state is a superposition of valence-bond states with the expansion coefficients being products of individual bond amplitudes that depend only on the bond shape. In two dimensions, these states have Neel order or are spin liquids, but they never have any valence-bond solid order. We construct generalized amplitude-product states on the square lattice which include correlated weights for short-range bonds. Using these states, we explore phase transitions between Neel phase, valence-bond solid phases, and spin liquid. We also study the Neel-VBS transition in the standard amplitude-product states in one dimension.

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