

# Striped critical spin liquid in a spin-orbital entangled RVB state in a PEPS representation

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We introduce<sup>1</sup> a spin-orbital entangled (SOE) resonating valence bond (RVB) state on a square lattice of spins- $\frac{1}{2}$  and orbitals represented by pseudospins- $\frac{1}{2}$ . Like the standard RVB state, it is a superposition of nearest-neighbor hard-core coverings of the lattice by spin singlets, but adjacent singlets are favoured to have perpendicular orientations and, more importantly, an orientation of each singlet is entangled with orbitals' state on its two lattice sites. The SOE-RVB state can be represented by a projected entangled pair state (PEPS) with a bond dimension  $D = 4$ . This representation helps to reveal that the state is a superposition of striped coverings conserving a topological quantum number. The stripes are a critical quantum spin liquid. We propose spin-orbital Hamiltonians supporting a SOE-RVB ground state.

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<sup>1</sup> P.Czarnik, J.Dziarmaga; arXiv:1406.6841.