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Paired states of Chern-Simons fermions in quantum spin models

ANDREW ALLOCCA, Univ of Maryland-College Park, TIGRAN SEDRAKYAN, Fine Theoretical Physics Institute, Univ of Minnesota and Physics Frontier Center, Joint Quantum Institute, Univ of Maryland, VICTOR GALITSKI, Univ of Maryland-College Park — We consider exotic states constructed from the two-dimensional quantum spin-1/2 XY model on the square and hexagonal lattices. By applying a Chern-Simons transformation we represent the quantum spin model as a system of spinless fermions interacting via attached fluxes. The interaction is then decoupled in the Cooper and excitonic channels giving possible unconventional states of Chern-Simons fermions. We examine the mean field properties of these states and their relations to the original spin model.

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