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Topological spin ordering and Chern-Simons superconductivity TIGRAN SEDRAKYAN, University of Massachusetts Amherst , VICTOR GALITSKI, University of Maryland, College Park, ALEX KAMENEV, University of Minnesota — We will discuss how the Chern-Simons (CS) fermion representation of s =1/2 spin operators paves the way to construction of topological, long-range magnetically ordered states of interacting two-dimensional (2D) quantum spin models. It will be shown that the fermion-fermion interactions mediated by the dynamic CS flux attachment may give rise to Cooper pairing of the fermions. Specifically, in an XY model on the honeycomb lattice, this construction leads to a "CS superconductor," which belongs to a topologically non-trivial in 2D symmetry class DIII, with particle-hole and time-reversal symmetries. It is shown that in the original spin language, this state corresponds to a symmetry protected topological state, which coexists with a magnetic long-range order. We discuss physical manifestations of the topological character of the corresponding state.

Tigran Sedrakyan
University of Massachusetts Amherst

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