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Topological Pair-Density-Wave Superconducting States[1] RODRIGO SOTO GARRIDO, GIL YOUNG CHO, EDUARDO FRADKIN, University of Illinois at Urbana-Champaign — We show that the pair-density-wave (PDW) superconducting state emergent in extended Heisenberg-Hubbard models in two-leg ladders is topological in the presence of an Ising spin symmetry. This topological PDW state supports a Majorana zero mode (MZM) at an open boundary and at a junction with a uniform one-dimensional d-wave superconductor. Similarly to a conventional finite-momentum paired state, the order parameter of the topological PDW state is a charge-2e field with finite momentum, and a subleading charge 4e uniform SC order. However, the topological PDW order parameter here is a *quartic* electron operator and conventional mean-field theory cannot be applied to study this state. We use bosonization to show that the 1D PDW state has a MZM at a boundary.

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