

# Projected BCS states and spin Hamiltonians for the $SO(n)_1$ Wess-Zumino-Witten model

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**Reference:**

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We propose a class of projected BCS wave functions and derive their parent spin Hamiltonians. These wave functions can be formulated as infinite matrix product states constructed by chiral correlators of Majorana fermions. In one dimension, the spin Hamiltonians can be viewed as  $SO(n)$  generalizations of Haldane-Shastry models. We numerically compute the spin-spin correlation functions and Rényi entropies for  $n=5$  and  $6$ . Together with the results for  $n=3$  and  $4$ , we conclude that these states are critical and their low-energy effective theory is the  $SO(n)_1$  Wess-Zumino-Witten model. In two dimensions, we show that the projected BCS states are chiral spin liquids, which support non-Abelian anyons for odd  $n$  and Abelian anyons for even  $n$ .

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