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Braiding statistics of strings with general linking in 3+1D topological order CHAO-MING JIAN, Univ of California - Santa Barbara, XIAO-LIANG QI, Stanford University — In contrast to topological orders in 2+1D, the unifying structure of 3+1D topological phases is not yet well understood. In order to shed light on such a unifying structure, we study a large set of topological states given by the Dijkgraaf-Witten gauge theories. In particular, we are interested in the fusion and the braiding statistics of the string excitations in such theories. Previous studies of the string braiding statistics only focused on a specific type of string configurations that enables a dimensional reduction of the problem from 3+1D to 2+1D. In this work, we focus on more general string configurations that do not generally admit a dimensional reduction picture. We show how the fusion and braiding statistics depends on the linking of the strings in these configurations. We also derive several consistency conditions of the string braiding statistics, which we conjecture to be true for the most general 3+1D topological states.

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