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Anyons from Three-Body Hard-Core Interactions in One Dimension NATHAN HARSHMAN, ADAM KNAPP, American University — Traditional anyons in two dimensions have generalized exchange statistics governed by the braid group. By analyzing the topology of configuration space, we discover that an alternate generalization of the symmetric group governs particle exchanges when there are hard-core three-body interactions in one-dimension. We call this new exchange symmetry the traid group and demonstrate that it has abelian and non-abelian representations that are neither bosonic nor fermionic, and which also transform differently under particle exchanges than braid group anyons. We show that generalized exchange statistics occur because, like hard-core two-body interactions in two dimensions, hard-core three-body interactions in one dimension create defects with co-dimension two that make configuration space no longer simply-connected. Ultracold atoms in effectively one-dimensional optical traps provide a possible implementation for this alternate manifestation of anyonic physics.

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