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Terry Gannon and **Corey Jones*** (jones.6457@osu.edu). *Vanishing categorical obstructions for permutation orbifolds.*

The orbifold construction $A \mapsto A^G$ is a fundamental method of producing new rational conformal field theories (vertex algebras, conformal nets) from old ones with symmetries. The construction at the level of modular tensor categories $Rep(A) \mapsto Rep(A^G)$ is called gauging. While this construction is always possible for modular tensor categories and symmetries arising from RCFT, it is not always possible for an abstract modular tensor category with symmetry. There is a cohomological obstruction for the existence of a suitable G -crossed extension (which in the abstract setting plays the role of twisted modules).

A major question is whether all modular tensor categories arise from RCFT. It was asked by Muger whether these obstructions always vanish when G is a group acting on $\mathcal{C}^{\boxtimes n}$ by permuting the tensor factors. If there was an example where they failed to vanish \mathcal{C} could not arise from a RCFT since permutation orbifolds always exist. However, we will sketch a proof that these obstructions always vanish, hence permutation extensions also exist in the abstract setting. An algorithm for computing the fusion rules of these extensions will be presented in a talk by Colleen Delaney. Based on joint work with Terry Gannon. (Received September 16, 2019)