3d Topological Orders Labeled by Seifert Manifolds

FEDERICO BONETTI

Topological orders in 2+1 dimensions are captured by modular tensor categories (MTCs). We propose a correspondence that assigns a fusion category to a pair (M,G), where M is a Seifert 3-manifold and G is an ADE Lie group. We conjecture that the fusion category associated to (M,G) is an MTC if and only if M has trivial first homology group with coefficients in the center of G. The construction determines the spins of anyons and their S-matrix, and provides a constructive way to access the R- and F-symbols from simple building blocks. We explore the possibility that this correspondence provides an alternative classification of MTCs, which is put to the test by realizing all MTCs (unitary or non-unitary) with rank at most 5.