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Title: Three-tier CFT's from Frobenius algebras.

Abstract: The idea of extending quantum field theories to manifolds of lower dimension was first proposed by Dan Freed in the nineties. In the case of conformal field theory (CFT), we are talking of an extension of the Atiyah-Segal axioms where one replaces the bordism category of Riemann surfaces by a suitable bordism 2-category, whose objects are points, whose morphism are 1-manifolds, and whose 2-morphisms are pieces of Riemann surface.

There is a beautiful classification of full (rational) CFT due to Fuchs, Runkel and Schweigert. the classification say roughly the following. Fix a chiral algebra A (= vertex algebra). Then the set of full CFT whose left and right chiral algebras agree with A is classified by Frobenius algebras internal to $\text{Rep}(A)$. A famous example to which one can successfully apply this is the case when the chiral algebra A is affine $su(2)$: in that case, the Frobenius algebras in $\text{Rep}(A)$ are classified by A_n, D_n, E_6, E_7, E_8, and so are the corresponding CFTs.

Recently, Kapustin and Saulina gave a conceptual interpretation of the FRS classification in terms of 3-dimentional Chern-Simons theory with defects. Those defects are also given by Frobenius algebra object in $\text{Rep}(A)$.

Inspired by the proposal of Kapustin and Saulina, we will (partially) construct the three-tier CFT associated to a Frobenius algebra object.