3-DIMENSIONAL HQFTS

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Homotopy quantum field theory (HQFT) is a branch of quantum topology concerned with maps from manifolds to a fixed target space. The aim is to define and to study homotopy invariants of such maps using methods of quantum topology. I will focus on 3-dimensional HQFTs with target the Eilenberg-MacLane space $K(G,1)$ where G is a discrete group. (The case $G=1$ corresponds to 3-dimensional TQFTs.) These HQFTs provide numerical invariants of principal G-bundles over closed 3-manifolds which can be viewed as "quantum" characteristic numbers. To construct such HQFTs, the relevant algebraic ingredients are G-graded categories, which are monoidal categories whose objects have a multiplicative G-grading.
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