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Classification of smooth principal 2-group bundles

A smooth 2-group $\mathcal{G}$ is a categorical analogue of a Lie group: it is a smooth stack with a multiplication morphism, associative up to 2-isomorphism. I will explain several approaches to the classification of principal $\mathcal{G}$-bundles over a smooth manifold or stack, paralleling the classifications of ordinary principal bundles via local/cocycle data or maps into the classifying stack. I will outline the anticipated application of this framework to Chern–Simons theory. This is joint work in progress with Dan Berwick-Evans and Laura Murray, building on previous work with Berwick-Evans, Murray, Apurva Nakade, and Emma Phillips on the classification of principal bundles for finite 2-groups and applications to Dijkgraaf–Witten theory.