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Equivariant sheaves and torsors beyond groupoids

Abstract: In my earlier work in noncommutative geometry I introduced analogues of torsors for coactions of Hopf algebras on nonaffine noncommutative spaces. A puzzling class of 'big' examples called for a nonflat descent, which should be replaced for geometric purposes by (derived) descent up to higher homotopies. Combinatorially, similar higher cocycles appear also in the study of descent for weak actions of categorical groups (in ordinary "commutative" geometry) and bigroupoids. These objects are relevant for study of "differential geometry of gerbes" now popular in geometry and physics. The notion of equivariant sheaves in this setup is far more involved than in 1-categorical situation. I will outline our work in progress concerning these ideas.