NONCOMMUTATIVE SYMMETRIES – A HIGHER CATEGORY APPROACH –

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Abstract:
Many operator algebras describe "noncommutative spaces" admitting intrinsic symmetries that cannot be described in a classical way, through a group action. However, many of these "noncommutative symmetries" can be understood in a broader spectrum via the use of 2-groups or even 2-groupoids. While a groupoid can be seen as a category where all morphisms are invertible, a 2-groupoid is nothing but a 2-category (or bicategory) where all morphisms and 2-morphisms are invertible. A 2-group is just a 2-groupoid with a single object. To understand how these act on objects of other bicategories, like C*-algebras, we use the theory of bicategories and look at weak functors from a 2-groupoid to certain bicategories of C*-algebras. This gives us a good flexibility and allows to understand several sorts of new symmetries and also rediscover known ones from a different point of view.