Internal categories of factors

Juan Orendain
Universidade Federal de Santa Catarina/UNAM

A natural extension of the Haagerup standard form construction to finite index inclusions of factors, and more generally to finite morphisms between semisimple von Neumann algebras, was proposed by Bartels, Douglas and Hénriques in their quest for a symmetric monoidal tricategory of coordinate-free conformal nets. This extension is shown to form a tensor functor, which together with a corresponding functorial extension of Connes fusion, provides factors, finite index morphisms, bimodules and equivariant intertwiners with the structure of a category internal to symmetric monoidal categories. The problem of existence of an internal category of factors, not-necessarily finite index morphisms, bimodules and equivariant intertwiners remains open.

We explain how this problem relates to classical constructions and arguments in non-abelian algebraic topology and how to use minimizing conditions and general constructions in the theory of double categories to provide formal solutions to this and related problems.

References:

1. Arthur Bartels, Christopher L. Douglas, André Hénriques. Dualizability and index of subfactors. Quantum Topology 5(3) 2011.

2. Arthur Bartels, Christopher L. Douglas, André Hénriques. Conformal Nets I: Coordinate-Free Nets. International Mathematics Research Notices 2015(13)

3. Ronald Brown, Philip Higgins, Rafael Sivera. Nonabelian algebraic topology: Filtered spaces, crossed complexes, cubical homotopy groupoids. Tracts in mathematics 15 EMS.

4. Juan Orendain. Internalizing decorated bicategories: The globularily generated condition. Theory and Applications of Categories, Vol. 34, 2019, No. 4, pp 80-108.

5. Juan Orendain. Free globularily generated double categories. Theory and Applications of Categories, Vol. 34, 2019, No. 42, pp 1343-1385.

6. Juan Orendain. Free Globularly Generated Double Categories II: The Canonical Double Projection. Submitted. Arxiv version: arXiv:1905.02888.