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Higher C^ -categories with non-commutative exchange*

C^* -categories have been around since the work of S. Doplicher and J. Roberts on superselection in algebraic quantum field theory, and axioms for 2- C^* -categories have been proposed by R. Longo, J. Roberts and studied by P. Zito.

We first review and compare some tentative definitions for strict higher C^* -categories and higher Fell bundles that were developed in joint work with R. Conti, W. Lewkeeratiyutkul and N. Suthichitranont. We tentatively suggest to relax the exchange property in the definition of globular n -categories in order to include important non-commutative situations that would be otherwise ruled out by the standard Eckmann–Hilton argument. Examples coming from the theory of hypermatrices are discussed as well as applications to the mathematical formalization of C. Rovelli’s relational quantum mechanics.