

planetmath.org

Math for the people, by the people.

quantum fundamental groupoid

Canonical name QuantumFundamentalGroupoid

Date of creation 2013-03-22 18:15:53 Last modified on 2013-03-22 18:15:53

Owner bci1 (20947) Last modified by bci1 (20947)

Numerical id 62

Author bci1 (20947)
Entry type Definition
Classification msc 55Q05
Classification msc 55U40
Classification msc 20L05

Synonym quantum spacetimes homotopy theory

Related topic FundamentalGroupoidFunctor Related topic SpinNetworksAndSpinFoams

Related topic QuantumGroupoids2 Related topic GroupoidCategory

Related topic SpinNetworksAndSpinFoams

Related topic FunctorCategories
Related topic FundamentalGroupoid
Related topic HomotopyGroups

Related topic HigherDimensionalAlgebraHDA

Related topic GeneralizedVanKampenTheoremsHigherDimensional

Related topic Quantu

Defines category of quantum groupoids

Defines Frechét spaces

Definition 0.1. A quantum fundamental groupoid $F_{\mathcal{Q}}$ is defined as a functor $F_{\mathcal{Q}}: \mathbf{H}_B \to \mathcal{Q}_G$, where \mathbf{H}_B is the category of Hilbert space bundles, and \mathcal{Q}_G is the category of locally compact quantum groupoids and their homomorphisms.

0.1 Fundamental groupoid functors and functor categories

The natural setting for the definition of a quantum fundamental groupoid $F_{\mathcal{Q}}$ is in one of the functor categories—that of http://planetmath.org/FundamentalGroupoidFunctor groupoid functors, $F_{\mathcal{G}}$, and their http://planetmath.org/NaturalTransformationnatural transformations defined in the context of quantum categories of quantum spaces \mathcal{Q} represented by Hilbert space bundles or rigged Hilbert (also called Frechét) spaces \mathbf{H}_{B} .

Other related functor categories are those specified with the general definition of the fundamental groupoid functor, $F_{\mathcal{G}}$: **Top** $\to \mathcal{G}_2$, where **Top** is the category of topological spaces and \mathcal{G}_2 is the http://planetmath.org/GroupoidCategorygroupoid category.

Example 0.1. A specific example of a quantum fundamental groupoid can be given for spin foams of spin networks, with a spin foam defined as a functor between spin network categories. Thus, because spin networks or graphs are specialized one-dimensional CW-complexes whose cells are linked quantum spin states, their quantum fundamental groupoid is defined as a functor representation of CW-complexes on rigged Hilbert spaces (also called Frechét nuclear spaces).