Von Neumann Categories

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Abstract.

We introduce the notion of a *von Neumann category*, which we are proposing as a categorification of von Neumann algebra. A von Neumann category is a premonoidal category with compatible dagger structure which embeds as a double commutant into a suitable premonoidal category of Hilbert spaces.

The notion was inspired by *algebraic quantum field theory*. In AQFT, one assigns to open regions in Minkowski space a C*-algebra. Premonoidal categories provide a natural framework for lifting such structure from algebras to categories. Thus von Neumann categories serve as a possible basis for extending the abstract quantum mechanics of Abramsky and Coecke to include relativistic effects.

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