Mathematical structure of quantum physics

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Abstract

The theory of operator algebras has been one of the most pervasive topics both in mathematics and mathematical physics, in particular, in the mathematical description of quantum mechanics and quantum field theory. In this project we will study different mathematical structures related to quantum physics. Depending on the background of the candidate we can explore one of the following aspects:

- C*-algebras associated to the canonical commutation relations. In particular, we will analyse some of the mathematical aspects of the so-called Weyl and resolvent algebras. Weyl and resolvent algebras.
- Modular theory for von Neumann algebras and its relation to quantum field theory.
- Approximations and quantum information theory.

References

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2. F. Lledó, *Modular Theory by example*, Cont. Math., **534** (2011) 73-96. math.OA/0901.1004