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CONJUGATE OBJECTS IN QUANTUM COMMUNICATION

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The basis of quantum communication is a set of methods for transfer of information encoded with the help of quantum states of elementary particles. The carrier of a unit of quantum information in this case is a qubit - a two-level quantum system (a photon with vertical and horisontal polarizations, an electron with two basic states, an ion of a hydrogen molecule H+2 with basic states of electron localization at the first or second proton, etc.). Nuclear objects - nucleons can also be considered as a qubit with two basic states in the isospin space.
In [1], we construct the algebraic model for the study of few-nucleon systems with non-abelian superselection rules, and in [2], this model was applied to describe the transfer of quantum information in the presence of constraints by superselection rules by isospin. Isospin is a non-abelian charge and it is convenient to describe such charges based on the framework symmetric tensor C-*categories. In [2], it was shown that the transmitted number of classical messages encoded in qubits is equal to the number of coherent superselection sectors, taking into account their multiplicity. Within the framework of algebraic model, superselection sectors can be defined as a class of unitary equivalence of an irreducible endomorphism [ρ] (as an object of the C*-category) of the algebra of observables of the system.
In the study of the quantum communication, as well as quantum cryptography, due to the compensating property, the conjugate charge also plays an important role. In this paper, a study is carried out of conjugate superselection sectors [ρ]* corresponding to a conjugate object (charge) of the category. It is shown that the constructed conjugate object satisfies the required conjugate equations. Classes of morphisms intertwining super-selection sectors and certain functions over these morphisms are studied, which allow us to identify the properties of the conjugate charge generating certain superselection rules.

The speaker is a student or young scientist

No

Section

1. Applications of nuclear methods in science and technology

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