

THE SUPERSELECTION MODEL FOR THE ALGEBRA OF CANONICAL ANTICOMMUTATION RELATIONS IN THE FRAMEWORK OF C*-CROSSED PRODUCT

Aukhadiev M.A., Nikitin A.S., Sitdikov A.S.
Kazan State Power-Engineering University, Russia
E-mail: airat_vm@rambler.ru

The purpose of the present work is the study of properties of the algebra of canonical anticommutation relations (CAR) of finite fermi-systems in presence of the superselection rules. The general mathematical theory for it was developed by S. Doplicher and J. Roberts in the early 90s [1]. For it we suggest to construct the so-called crossed product of the CAR-algebra (algebra of observables), embedded in Cuntz algebra by the recursive fermion construction [2], with semigroup of its endomorphisms and receive more expanded algebra- the C*- field algebra of considering system. It will allow to define the compact group of the internal (gauge) symmetry of the system as group of automorphisms of this field algebra. The C*-category of the representations of this group defines superselection sectors and according to the Doplicher-Roberts duality [1], is dual object to the C*-category representations of the algebra of observables.

We also find irreducible representations of the embedded subalgebra, which from the physical point of view correspond to the superselection sectors, which are indexed by values of electric charge. Also it is shown that unitaries which intertwine different sectors correspond to field operators of the field algebra.

1. S.Doplicher, J.E.Roberts // Comm. Math. Phys. 1990. V.131. P.51.
2. M.Abe, K.Kawamura // Comm. Math. Phys. 2002. V.228. P.85.