
PAWEŁ DUCH, Jagiellonian University

Adiabatic limit and vacuum state in Epstein-Glaser approach to perturbative quantum field theory

The fundamental objects of Epstein-Glaser approach to perturbative quantum field theory are the time-ordered products of polynomials in the basic fields and their derivatives. Their construction is carried out in the position space and does not require the introduction of any ultraviolet regularization. Using the time-ordered products one can easily define the scattering matrix, the interacting fields and other objects of interests in the interacting theory in which the coupling constant is replaced by a Schwartz function called the switching function. The switching function plays the role of the infrared regulator, which is removed by taking the adiabatic limit.

In the talk, I will outline my recent results about the existence of the so-called weak adiabatic limit. The result allows to construct the Wightman and Green functions in a large class of models, which includes all models with interaction vertices of dimension 4. The existence of the weak adiabatic limit can be also used to define a vacuum state (a real, normalized, positive, Poincaré-invariant functional) on the algebra of interacting fields constructed by means of the algebraic adiabatic limit.