

Mathematical Physics

Mathematical theory of Bogoliubov Hamiltonians

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I would like to review the theory of Bogoliubov Hamiltonians, that is, self-adjoint operators on a Fock space, formally defined by expressions quadratic in creation and annihilation operators.

There are several natural varieties of Bogoliubov Hamiltonians, among them "Weyl-quantized", "Wick-quantized" and "renormalized". Their theory is relatively straightforward if the 1-particle space is finite dimensional, but becomes quite sophisticated if the 1-particle space is infinite dimensional.

Bogoliubov Hamiltonians are relevant for various important problems of quantum field theory and many body quantum physics, such as renormalization, existence of vacuum, existence of quantum dynamics, finiteness of vacuum energy.