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Particle density of the CAR algebra and the particle-hole duality in continuum

Abstract

We discuss the particle density of the gauge-invariant quasi-free states on the algebra of the canonical anticommutation relations (CAR algebra). It is known that, for the vacuum state, the corresponding particle density is a determinantal point process with correlation kernel $0 \leq K \leq 1$. In the case of a discrete underlying space a particle-hole duality leads to a determinantal point process with a J-Hermitian correlation kernel, i.e., the corresponding operator K is self-adjoint in an indefinite scalar product. We propose how to perform a particle-hole duality in the case of a continuous underlying space by modifying the notion of a particle density. Our aim is to show that the correspond modified particle density is a determinantal point process with a J-Hermitian correlation kernel.