A SEMIGROUP-BASED TENSOR FORMULATION FROM THE FOCK STATE OF A PHOTON GAS IN A ONE-DIMENSIONAL RESONANT CAVITY

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Abstract

Given that the photon is the fundamental quantum of electromagnetic field, by starting from the fact that the quantum state of the electromagnetic field may be expressed as a Fock state and for a photon gas confined into a one-dimensional resonant cavity at quasi-zero absolute temperature, we extract and characterize an algebraic semigroup such that the photon-number operator in the Fock state is the tensorial product of the one-element orbits of this semigroup over the space of photon-number states. In addition, the operator product of the Hamiltonian and photon-number operators is determined and the expectation values of these operators are calculated