

## Quantum Physics

# Wigner functions of thermo number state, photon subtracted and added thermo vacuum state at finite temperature

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Based on Takahashi-Umezawa thermo field dynamics and the order-invariance of Weyl ordered operators under similar transformations, we present a new approach to deriving the exact Wigner functions of thermo number state, photon subtracted and added thermo vacuum state. We find that these Wigner functions are related to the Gaussian-Laguerre type functions of temperature, whose statistical properties are then analysed.

Comments: 10 pages and 2 figures

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