QUARK MATTER 2015
Sep. 27 – Oct. 3, 2015 Kobe, Japan

Contribution ID: **591** Type: **Poster**

Quantum corrections to the stress-energy tensor in thermodynamic equilibrium with acceleration

Tuesday, 29 September 2015 16:30 (2 hours)

We show that the stress-energy tensor has additional terms with respect to the ideal form in states of global thermodynamic equilibrium in flat spacetime with non-vanishing acceleration and vorticity. These corrections are of quantum origin and their leading terms are of second order in the gradients of the thermodynamic fields. The relevant coefficients can be expressed in terms of correlators of the stress-energy tensor operator and the generators of the Lorentz group. With respect to previous assessments, we find that there are more second order coefficients and that all thermodynamic functions including energy density receive acceleration and vorticity dependent corrections. Notably, also the relation between ρ and p, that is the equation of state, is affected by acceleration and vorticity. We have calculated the corrections for a free real scalar field – both massive and massless – and we have found that they increase, particularly for a massive field, at very high acceleration and vorticity and very low temperature. Finally, these non-ideal terms depend on the explicit form of the stress-energy operator, meaning that different stress-energy tensor of the scalar field – canonical or improved – are thermodynamically inequivalent.

On behalf of collaboration:

NONE

Primary authors: GROSSI, Eduardo (University of Florence & INFN Florence); BECATTINI, Francesco (University of Florence)

Presenter: GROSSI, Eduardo (University of Florence & INFN Florence)

Session Classification: Poster Session

Track Classification: New Theoretical Developments