Institut Ruđer Bošković
ZAVOD ZA TEORIJSKU FIZIKU
Bijenička c. 54
Zagreb, Hrvatska

SEMINAR ZAVODA ZA TEORIJSKU FIZIKU

(Zajednički seminari Zavoda za teorijsku fiziku,
Zavoda za eksperimentalnu fiziku i Zavoda za teorijsku fiziku PMF-a)

Manifestly Retarded formalism for Out-of-equilibrium Thermal Field Theories

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Datum: srijeda, 4. srpnja 2007.
Vrijeme: **15:30 sati c.t.**
Mjesto: IRB, predavaona I krila

Abstract:

We define perturbation expansion in finite time out-of-equilibrium TFT expressed exclusively in retarded and advanced propagators and represented by Feynman-like diagrams. The physical quantities are represented by equal-time-limit of multi-point Greens functions. In the diagrams there are "normal" vertices in which energy is conserved, "sink" vertices (only incoming retarded and outgoing advanced propagators) in which energy cannot be conserved (at least in the equal-time limit), and "source" vertices (only outgoing retarded and incoming advanced propagators) which are absent from expansion, thus leading to the absence of closed diagram contributions to physical quantities. The "sink" vertices are naturally regulated, and no illdefined expressions ("pinching") appear. The safe time-to-infinity limit is enabled. The naive Keldysh time-path formulation is clearly out. Other functions e.g. higher retarded propagator make sense only as a subgraph of equal-time-limit of multi-valued Greens function.

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