



UNIVERSITÀ DEGLI STUDI
DI TRENTO
Dipartimento di Fisica

Dott. Luca Gallerani

Università di Bologna

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Towards a causal (effective) thermodynamics of scalar-tensor gravity

Abstract:

The thermal analogy between the effective fluid of scalar-tensor gravity and Eckart's irreversible thermodynamics is extended to the causal Israel-Stewart model, adopting the minimal ansatz of promoting the heat flux density to a timelike vector. This choice yields analytically manageable constitutive equations, allowing for the first consistent decoupling of the effective temperature $\mathcal{T}$ and the effective thermal conductivity $\mathcal{K}$ of scalar-tensor gravity. Crucially, this new framework preserves the interpretation of general relativity as the equilibrium state approached via a dynamical relaxation process in the vanishing- $\mathcal{K}$ limit. This new causal formalism is finally applied to exact solutions in cosmology.

Contact:

Dipartimento di Fisica
Via Sommarive, 14
38123 Povo, Trento
+39 0461/282042 – 1504 – 1575 - 1219
df.supportstaff@unitn.it

Scientific Coordinator:

prof. Massimiliano Rinaldi