Contribution ID : **168** Type : **not specified**

Thermodynamics and quantum critical magnetocaloric effect in Einstein-Maxwell-Chern-Simons theory

Tuesday, 3 December 2024 17:50 (20)

Thermodynamics of black holes offers a promising avenue for exploring the quantum nature of black holes and quantum gravity. In this work, we investigate the thermodynamic properties of dyonic black holes in the five-dimensional Einstein-Maxwell-Chern-Simons theory, obtained from IIB supergravity. We demonstrate that the standard form of the first law of thermodynamics is inconsistent with the quantum statistical relation widely adopted in black hole physics. By employing the on-shell variation of the Euclidean action and the Iyer-Wald formalism, we resolve this discrepancy and derive both the standard form of the first law and Smarr formula for the dyonic black holes. Furthermore, our findings are corroborated by numerical tests and are consistent with general hydrodynamic expectations. We will also discuss the quantum critical magnetocaloric effect (MCE) in this holographic model, where we show the existence of quantum criticality, obtain its universality class, and discuss the MCE characterized by the Gruneisen parameter.

Presenter(s) : ZHAO, Jun-Kun (Institute of Theoretical Physics, Chinese Academy of Sciences)

Session Classification : Day 4: Parallel session II