

# Optimal Control of Finite-Time Transformations in Black Hole Thermodynamics

*Thursday 10 July 2025 16:00 (20 minutes)*

We analyze optimal finite-time thermodynamic transformations in black hole spacetimes using geometric control theory. For Schwarzschild and Kerr black holes, we study protocols minimizing entropy production or energy cost under constraints set by thermodynamic metrics. We compare Hessian and Legendre-invariant thermodynamic geometries, focusing on their influence on thermodynamic length and process probability. Our results show how the choice of metric affects optimal paths and dissipation bounds in these systems.

**Primary authors:** Dr RADOMIROV, Miroslav (Sofia University "St. Kliment Ohridski"); Prof. RASHKOV, Radoslav (Sofia University "St. Kliment Ohridski"); VETSOV, Tsvetan (Sofia University "St. Kliment Ohridski"); Dr AVRAMOV, Vasil (Sofia University "St. Kliment Ohridski")

**Presenter:** VETSOV, Tsvetan (Sofia University "St. Kliment Ohridski")

**Session Classification:** High Energy, Particle Physics, Gravitation and Cosmology

**Track Classification:** S05 –High Energy, Particle Physics, Gravitation and Cosmology