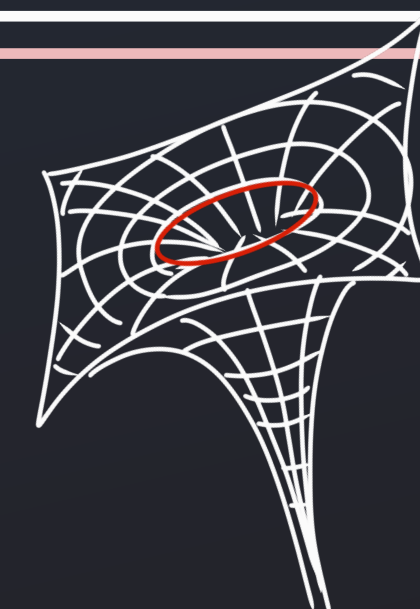




BLACK HOLE SOLUTIONS

and their thermodynamics properties



in $f(R)$ gravity with generalized entropy



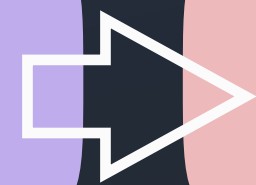
Piyachat Panyasiripan

Supervisor : Assoc.Prof. Pitayuth Wongjun

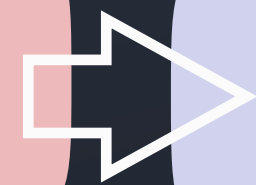
Modified Gravity with Generalized Entropy

Modified Gravity Theory

Modified Gravity
Theory



$f(R)$ gravity



BH Solution
in $f(R)$ gravity

The black hole solution in $f(R)$ gravity of theory

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<https://doi.org/10.1140/epjc/s10052-023-12349-2>

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Regular Article - Theoretical Physics

Extension of the Schwarzschild black hole solution in $f(R)$ gravitational theory and its physical properties

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For my research work

$$F(r) = \frac{df(R(r))}{dR(r)} = 1 + \alpha r^2$$



New Black Hole Solution

Physical Properties Checking



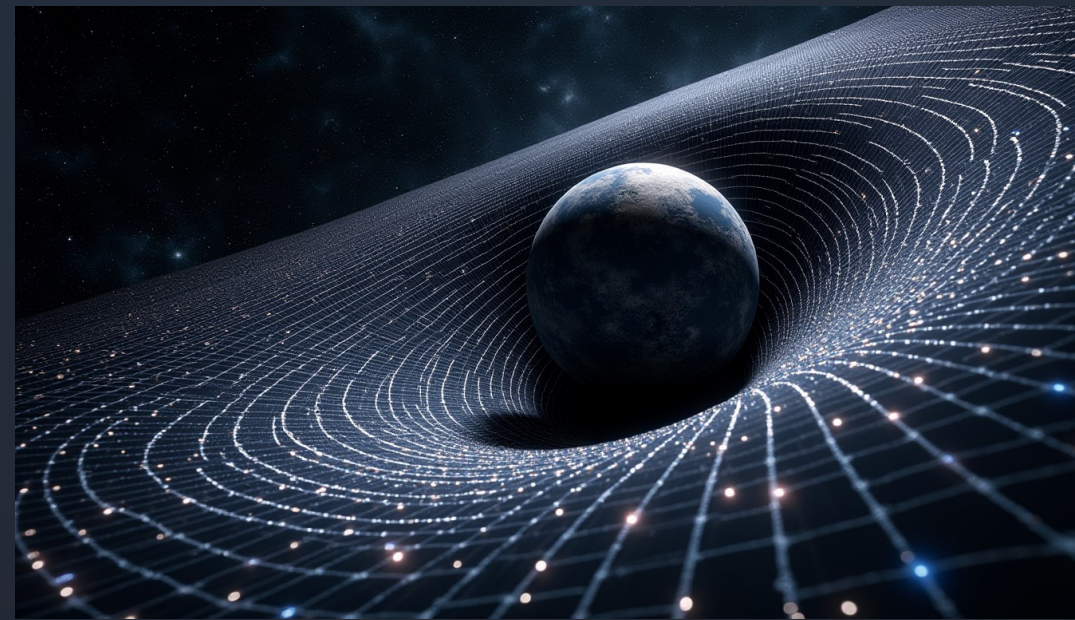
1st law of BH mechanics



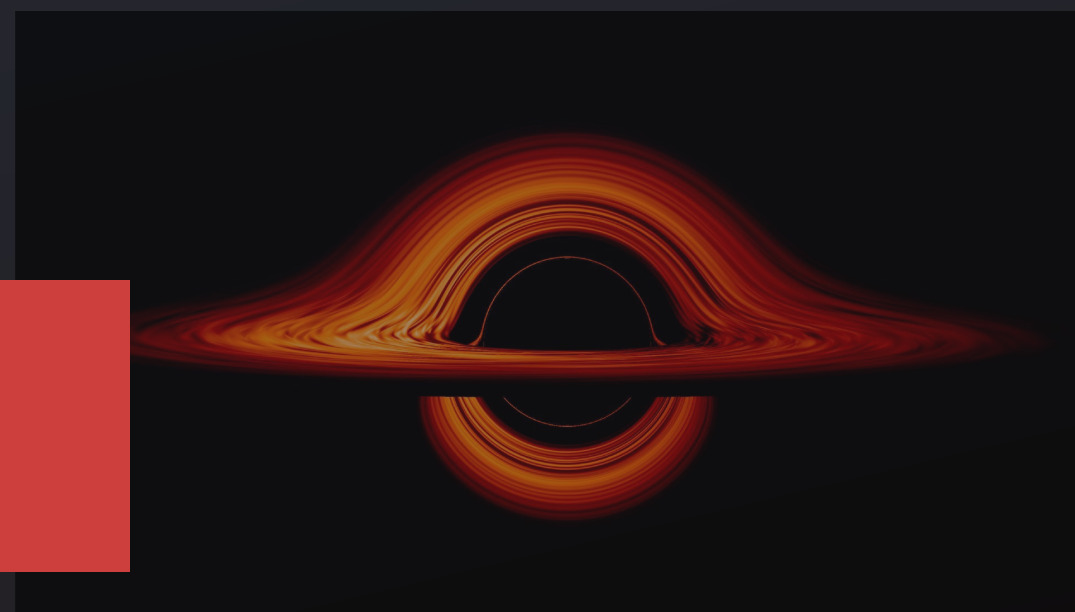
Thermodynamic Stability

Black Hole Thermodynamics

General Relativity



Black Hole Solution



Black Hole Thermodynamic

The area
of
Black Hole

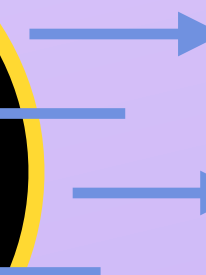
$$T_H = \frac{\kappa}{2\pi}.$$

$$S_H = \frac{A_H}{4G}.$$

Thermodynamic object



Black Hole



“Surrounding”

Black Hole Thermodynamic Stability

Global Stability

$$\mathcal{H}_{ab}^E(\vec{E}) = \frac{\partial^2 E(\vec{E})}{\partial E^a \partial E^b} \bigg|_{E^1, \dots, \hat{E}^a, \dots, \hat{E}^b, \dots, E^n}$$

Energy Representation

Local Stability

$$C = \frac{dQ}{dT} = T \frac{\partial S}{\partial T}$$

Heat Capacity

Schwarzschild black hole
AdS-Schwarzschild black hole
dS-Schwarzschild black hole