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(G*) Dynamic behaviours of black hole phase transitions near quadruple points

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Treating the horizon radius as an order parameter in a thermal fluctuation, the free energy landscape model sheds light on the dynamic behaviour of black hole phase transitions. Here we carry out the first investigation of the dynamics of the recently discovered multicriticality in black holes. We specifically consider black hole quadruple points in D = 4 Einstein gravity coupled to non-linear electrodynamics. We observe thermodynamic phase transitions between the four stable phases at a quadruple point as well as weak and strong oscillatory phenomena by numerically solving the Smoluchowski equation describing the evolution of the probability distribution function. We analyze the dynamic evolution of the different phases at various ensemble temperatures and find that the probability distribution of a final stationary state is closely tied to the structure of its off-shell Gibbs free energy.

Keyword-1

Black Holes

Keyword-2

Classical Theories of Gravity

Keyword-3

Models of Quantum Gravity

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