Contribution ID: **64** Type: **Talk**

Quasinormal modes and absorption cross-section of a Bardeen black hole in presence of perfect fluid dark matter

Thursday 3 July 2025 13:30 (25 minutes)

In this talk, we explore the quasinormal modes (QNMs) and absorption cross sections of the $(3+1)$-dimensional Bardeen black hole spacetime surrounded by perfect fluid dark matter. While the case of massless scalar field perturbations has been previously addressed, our analysis focuses on two less explored scenarios: massive scalar field perturbations and massless Dirac field perturbations.

To compute the QN frequencies, we apply the semi-analytical WKB method up to third order. For consistency and validation, we also use the Pöschl-Teller approximation and compare the results across both approaches.

Our analysis considers variations in three key parameters of the model: the mass of the scalar field μ, the dark matter parameter α, and the magnetic charge g. The computed QN frequencies are presented in tables and plots for clarity.

In the second part of the study, we compute the absorption cross section using the third-order WKB method. Specifically, we evaluate the reflection and transmission coefficients as well as the partial absorption cross sections. The results, presented graphically, illustrate how the dark matter parameter α and the scalar field mass μ influence these quantities.

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Track Classification: Contributed talks