CIDMA CENTRO DE I&D EM MATEMÁTICA E APLICAÇÕES
CENTER FOR R&D IN MATHEMATICS AND APPLICATIONS

universidade de aveiro

Gravitational Geometry and Dynamics Group Seminar

Tue., May 5, 2026, at 14h30.

Room: Sala Sousa Pinto and **Teams ID:** 372 048 781 696 133

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Gravitational synchronization in bosonic dark matter admixed neutron stars

Neutron stars offer unique natural laboratories for probing the interaction between dark matter and baryonic matter — a central open question in modern astrophysics and high-energy physics. In this talk, I will present our recent work modeling dark matter as an ultralight bosonic field that accretes onto neutron stars, forming composite objects — fermion-boson stars — bound through gravity.

I will discuss our long-term numerical relativity simulations in spherical symmetry, through which we extract and analyze the radial oscillation mode spectra of these systems. A key result I will highlight is the gravitational synchronization between the fermionic and bosonic components: regardless of the equation of state, both components lock in phase, enriching the oscillation spectrum and giving rise to new multi-state scalar configurations that reshape the hierarchy of neutron-star radial modes. I will also present a practical procedure we developed to compute the dominant oscillation mode frequencies as a function of the bosonic mass, and I will close by discussing the broader implications of these findings for neutron-star physics and the prospects for gravitational-wave detection.

More about Gr@v at: gravitation.web.ua.pt

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