Contribution ID: **2** Type: **not specified**

Quasi-Universal Relations for f-Mode Oscillations in Compact Stars

Monday, 2 March 2026 11:30 (15 minutes)

Gravitational wave astronomy provides a vital tool for probing extreme matter. This study investigates f-mode oscillations of cold, catalyzed Neutron stars as well as protoneutron stars with different evolutionary phases. We analyze the collective impact of nucleons, hyperons, phase transition to the quark matter, and dark matter admixtures on these oscillations employing full General Relativistic formalism.
The primary focus lies on the quasi-universal relations connecting f-modes to bulk stellar properties. Our results demonstrate that these relations remain robust across stars with hyperonic cores, quark matter, and dark matter, as well as in the specific conditions of proto-neutron stars. While the relations exhibit some model dependence, their stability across such diverse physical scenarios highlights their potential for constraining stellar properties from future gravitational wave detections.

References:

[1] I. A. Rather, K. D. Marquez, P. Thakur, and O. Lourenco, Phys. Rev. D 112, 023013 (2025).
[2] P. Thakur, I. A. Rather, and Y. Lim, Phys. Rev. D 112, 043017 (2025).
[3] P. Thakur, A. Issifu, I. A. Rather, Y. Lim, and T. Frederico, arXiv:2505.24104 (2025).

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