

Abstract Submitted
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Higher order equations to describe r-modes in Neutron Stars GIAMMARCO TURRIZIANI COLONNA, BENJAMIN OWEN, Texas Tech Univ — The structure and composition of Neutron Stars (NS) are unknown and the most promising way to understand them is through the Gravitational Waves (GW) asteroseismology. Between all the possible Quasi Normal Modes, the r-modes are the most promising source of GW because they can be unstable at an arbitrary angular velocity. The frequencies of r-mode oscillations of rotating NS can be useful for guiding and interpreting GW and electromagnetic (EM) observations, which makes this study of relevance to both LIGO scientists, and astrophysicists. The frequencies of slowly rotating, barotropic and non magnetic Newtonian stars are well known, but subject to various corrections. The most important one is the relativistic correction, and the second most important is the rapid rotation correction. For this reason we decided to study the Lockitch-Andersson-Friedman (LAF) equations, that describe r-mode oscillations of stars in General Relativity (GR), and we aim to extend these equations to higher order in the rotation rate expansion. Solving these equations would allow us to find a more precise range of frequencies than the one found in the literature.

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