



# Revealing the physics of r-modes in low-mass X-ray binaries

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We consider the astrophysical constraints on the gravitational-wave driven r-mode instability in accreting neutron stars in low-mass X-ray binaries. We use recent results on superfluid and superconducting properties to infer the core temperature in these neutron stars and show the diversity of the observed population. Simple theoretical models indicate that many of these systems reside inside the r-mode instability region. However, this is in clear disagreement with expectations, especially for the systems containing the most rapidly rotating neutron stars. The inconsistency highlights the need to re-evaluate our understanding of the many areas of physics relevant to the r-mode instability. We summarize the current status of our understanding, and we discuss directions for future research which could resolve this dilemma.

Comments: 5 pages, 3 figures; in Physical Review Letters; correct notation and minor typos

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