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Dr. Pranah Ghosh

Department of Astronomy and Astrophysics, Faculty Member

Tata Institute of Fundamental Research

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Collective Properties of X-ray Binaries in (Normal) Galaxies

Collective properties of X-ray binaries (XRB), *i.e.*, the distributions of their essential properties like X-ray luminosity and binary period, in Milky Way and other galaxies are now well-established observationally. We describe a theoretical framework for understanding these XRB distributions both outside and inside globular star clusters in these galaxies. Outside globular clusters, the essential process is the evolution of the distribution of primordial binaries into that of XRBs along the evolutionary path followed by an *individual* binary. High-mass X-ray binaries (HMXB) and low-mass X-ray binaries (LMXB) behave differently, as expected. We compare the calculated X-ray luminosity distribution (also known as X-ray Luminosity Function or XLF) with the observed one for HMXBs and LMXBs. Inside globular clusters, XRB formation and evolution are dominated by *stellar encounters*, which include tidal capture, exchange processes, and dissociation. We construct a Boltzmann scheme for describing the evolution of the XRB population of a globular cluster, focusing first on the dependence of the number of XRBs in a cluster on two essential cluster parameters. We compare the calculated dependence with the observed one.

Department Contact Information
Dr. Eric Schlegel eric.schlegel@utsa.edu
Christella Robledo Christella.Robledo@utsa.edu
http://physics.utsa.edu