



- RAY ASTRONOMY 2019

Current Challenges and New Frontiers in the Next Decade

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Probing the building blocks of galaxies: sub-galactic scaling relations between X-ray luminosity, SFR and stellar mass

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X-ray emission from star-forming galaxies is a new frontier for probing recent star-formation. X-ray emission, SFR, and stellar mass scaling relations are a unique probe of the connection between X-ray binaries and stellar populations. While most scaling relations are based on studies of the integrated emission of galaxies, very little is known about their validity and scatter in sub-galactic scales. We explored this connection using a sample representative of the star-formation activity in the local Universe (Star-Formation Reference Survey; SFRS) along with a comprehensive set of star-formation (radio, FIR, 24 μ m, 8 μ m, H α , UV, SED fitting) and stellar mass (K-band, 3.6 μ m, SED fitting) indicators, and X-ray observations. We investigated the X-ray luminosity –SFR and X-ray luminosity –stellar mass scaling relations down to sub-galactic scales of ~ 1 kpc². This way we extend these relations to extremely low SFR ($\sim 10^{-6}$ Msol/yr) and stellar mass ($\sim 10^6$ Msol), reaching the regime of dwarf galaxies. We also quantified their scatter and their dependence on the age of the local stellar populations as inferred from the different age sensitive SFR indicators, and we compare them with predictions from X-ray binary population synthesis models. These results are particularly important for setting the benchmark for the formation of X-ray binaries in vigorous, but low SFR objects such as the numerous dwarf galaxies and galaxies in the early Universe, and for including the X-ray band in panchromatic SED fitting models.

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

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