A study of the population of discrete sources and the diffuse gas in the merger star-forming galaxies Antennae and NGC3256

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Abstract

We present a detailed study of the discrete sources and diffuse emission detected in the Chandra observations of the star-forming galaxies Antennae and NGC3256. In both objects we detect a large number of sources with diverse properties. The majority of them are identified as X-ray binaries, based on their spectra and in some cases their variability. However, there are some soft and/or extended sources which can be identified with supernova remnants. We also discuss the properties of the discrete sources in optical, radio and infrared wavelengths in order to further understand their nature and connect them with the stellar populations in these galaxies. A very important result is the confirmation of previous indications that there is a population of sources with X-ray luminosities much higher than the Eddington limit for a $1M\odot$ compact object, suggesting that in the cases they are X-ray binaries emmiting isotropically they host black holes in the $10\text{-}1000M\odot$ mass range. We compare the luminosity function of the point sources in these two galaxies with that of the composite and other normal/"inactive" galaxies and we find that they are flatter. We also find that a significant amount of the total emission in both objects arises by a diffuse component. We study its properties and we show that it is most probably associated with gas heated by the starburst process. Finally in the case of NGC3256 we detect the highly obscured southern nucleus and we conclude that even if it is an AGN it does not contribute significantly in the overall emission of the galaxy.

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