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X-Ray variability in LINERs

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Abstract

Active galactic nuclei (AGN) are powered by energetic phenomena which cannot be attributed to stars. Among AGN, several objects can be described by the unified model (Antonucci 1993; Urry & Padovani 1995). However, several subclasses of objects that cannot be accommodated into this scheme, as is the case of LINERs (low ionisation narrow emission line regions) . Variability across the whole electromagnetic spectrum is one of the properties that characterized AGNs. Therefore, searching for variability in LINERs could unequivocally demonstrate the presence of a non-thermal source. Also, X-rays is one of the best ways to search for AGN signature. In this work (which is part of a larger study) we add more evidence about the X-ray variability in LINERs and investigate its origin. We study two LINER nuclei; NGC 1052 (type 2) and NGC 4278 (type 1). The data consist on different observations in different epochs (timescale of years), taken from XMM-Newton and Chandra archives, respectively. To search for variability we try to fit all the spectra with the same model using XSPEC; if we can fit all the spectra with the same parameters, it is supposed that the object is non-variable, whereas if we cannot fit them properly, it will be variable. In the last case we need to let one or more parameters to vary in the model, so it may provide clues to understand the nature of this variability. For NGC 1052 we fit a model containing a thermal component plus two power laws. This results in a variability due to changes in the column density and the slope of the power law, both at hard energies. This scenario is consistent with the variability understood as variations in the clouds intersecting the line of sight of the observer (see Rissalitti et al. (2007, 2010)), and is also compatible with the framework of the clumpy torus model (Elitzur 2006). For NGC 4278 the model contains a thermal component plus a single power law. The spectral fitting results in variations of the slope and normalization of the power law. This spectral fitting is consistent with the results provided by Younes et al. (2010), who had already reported a significant variability on this source. In this case the variability is attributed to intrinsic variations of the nuclear source. The presence of different mechanisms for LINERs have to be confirmed with a larger sample of LINERs which is under study.