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Evolution of ~ 6 Ms CDF-S galaxies : J/ApJ/825/7

The evolution of normal galaxy X-ray emission through cosmic history: constraints from the 6Ms Chandra Deep Field-South. (2016)

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Keywords : galaxies: evolution; surveys; X-rays: binaries; X-rays: galaxies; X-rays: general

Abstract: We present measurements of the evolution of normal-galaxy X-ray emission from $z \sim 0-7$ using local galaxies and galaxy samples in the ~ 6 Ms Chandra Deep Field-South (CDF-S) survey. The majority of the CDF-S galaxies are observed at rest-frame energies above 2keV, where the emission is expected to be dominated by X-ray binary (XRB) populations; however, hot gas is expected to provide small contributions to the observed-frame $\lesssim 1$ keV emission at $z \lesssim 1$. We show that a single scaling relation between X-ray luminosity (L_X) and star-formation rate (SFR) literature, is insufficient for characterizing the average X-ray emission at all redshifts. We establish that scaling relations involving not only SFR, but also stellar mass (M_*) and redshift, provide significantly improved characterizations of the average X-ray emission from normal galaxy populations at $z \sim 0-7$. We further provide the first empirical constraints on the redshift evolution of X-ray emission from both low-mass XRB (LMXB) and high-mass XRB (HMXB) populations and their scalings with M_* and SFR, respectively.

We began with an initial sample of 32508 galaxies in the Great Observatories Origins Deep Survey South (GOODS-S) footprint as presented in Section 2 of Xue et al. (2012, [J/ApJ/758/129](https://arxiv.org/abs/10.1086/1758129)). We cut our initial sample to the 24941 objects that were within 7' of the mean ~ 6 Ms CDF-S aimpoint, a region where the Chandra point-spread function (PSF) is sharpest and the corresponding X-ray sensitivity is highest. See text for further explanations.

See also:

- [J/ApJ/813/82](https://arxiv.org/abs/10.1086/181382) : $z < 0.06$ broad-line AGN emission-line measures (Reines+, 2015)
- [J/ApJ/801/97](https://arxiv.org/abs/10.1086/180197) : GOODS-S+UDS stellar masses from CANDELS (Santini+, 2015)
- [J/MNRAS/446/470](https://arxiv.org/abs/10.1093/mnras/446/470) : ULX candidates in luminous IR galaxies (Luangtip+, 2015)
- [J/ApJ/777/18](https://arxiv.org/abs/10.1086/177718) : Stellar mass functions of galaxies to $z=4$ (Muzzin+, 2013)
- [J/ApJ/776/L31](https://arxiv.org/abs/10.1086/1776131) : Energy feedback from XRB from $z=0$ to $z=19.92$ (Fragos+, 2013)
- [J/ApJ/774/136](https://arxiv.org/abs/10.1086/1774136) : Xray obs. of SINGS gal. compared to models (Tzanavaris+, 2013)
- [J/ApJ/766/19](https://arxiv.org/abs/10.1086/176619) : XRB population synthesis models in $0 < z < 20$ gal (Tremmel+, 2013)
- [J/ApJ/764/41](https://arxiv.org/abs/10.1086/176441) : X-ray binary evolution across cosmic time (Fragos+, 2013)
- [J/ApJ/758/129](https://arxiv.org/abs/10.1086/1758129) : 4Ms Chandra Deep Field South 6-8keV galaxies (Xue+, 2012)
- [J/A+A/542/A16](https://arxiv.org/abs/10.1086/154216) : X-ray detection of radio-selected SF galaxies (Ranalli+, 2012)
- [J/MNRAS/420/2190](https://arxiv.org/abs/10.1093/mnras/420/2190) : ECDFS sources with radio counterparts (Vattakunnel+, 2012)
- [J/MNRAS/419/2095](https://arxiv.org/abs/10.1093/mnras/419/2095) : HMXBs in nearby galaxies (Mineo+, 2012)
- [J/ApJ/742/3](https://arxiv.org/abs/10.1086/17423) : Photometric catalogs for ECDF-S and CDF-N (Rafferty+, 2011)
- [J/ApJ/740/37](https://arxiv.org/abs/10.1086/174037) : Obscured AGN at $z \sim 0.5-1$ in the CDFS (Luo+, 2011)
- [J/A+A/533/A119](https://arxiv.org/abs/10.1086/1533119) : GOODS-Herschel North and South catalogs (Elbaz+, 2011)
- [J/ApJS/195/10](https://arxiv.org/abs/10.1086/19510) : The CDF-S survey
- [J/ApJS/191/124](https://arxiv.org/abs/10.1086/191124) : Optical spectrosc. of ECDF-S X-ray sources (Silverman+, 2010)

- [J/ApJ/681/1163](#) : Late-type galaxies in Chandra deep fields (Lehmer+, 2008)
- [J/A+A/437/883](#) : K20 survey
- [J/ApJS/155/271](#) : CDF-South
- [J/ApJ/602/231](#) : Chandra X-ray point sources in nearby gal. (Colbert+, 2004)
- <http://hedam.lam.fr/GOODS-Herschel/> : GOODS-Herschel survey home page

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VizieR tables are built from archives with additional transformations.

J/ApJ/825/7 Evolution of ~6Ms CDF-S galaxies (Lehmer+, 2016)

The following files can be converted to FITS (extension .fit or fit.gz)

table1.dat table2.dat

Query from: <http://vizier.u-strasbg.fr/viz-bin/VizieR?-source=J/ApJ/825/7>

Go to [ftp](#) - [web page](#) - Download all tables in [tar.gz](#)

ReadMe	05-Oct-2016 15:46	-r--r-- r--	10K	
table1.dat	19-Aug-2016 17:31	-r--r-- r--	4.7 K	- text - txt.gz - fits - fits.gz - html
table2.dat	19-Aug-2016 17:31	-r--r-- r--	7.7 K	- text - txt.gz - fits - fits.gz - html