Preliminary analysis of the X-ray emission from the central regions of the Pictor A radio galaxy

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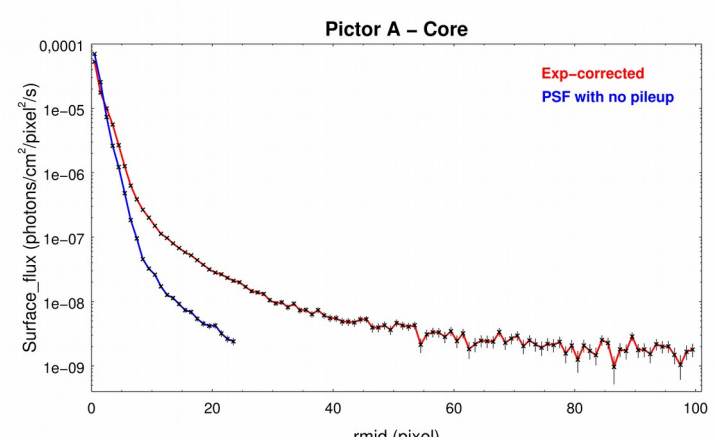
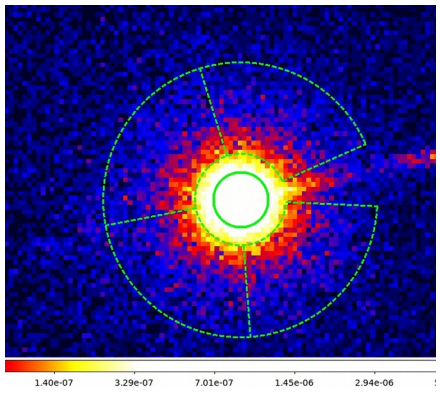
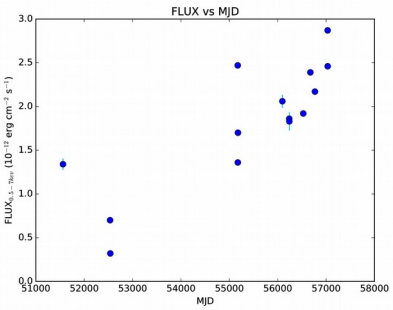
Pictor A is one of the most prominent radio source in the Southern sky.
Chandra has observed Pictor A on 14 separate occasions over the past 15 years, for a total of 464 ks of the observing time.
We have anayzed all the Chandra data for the target using software CIAO 4.9 and CALDB 4.6.7.
The resulting X-ray surface brightness profile of the central parts of Pictor A (up to 100 px ≃ 50" from the core, i.e. ∼ 35 kpc at the soource distance).
For the AGN spectral analysis, we have extracted the source spectra from the circular region with radius 6 px for each pointing; the backgrounds were taken from the annual region (omitting the jet) with radii 10 px and 30 px.
Best fitting parameters of the xsphabs*xspowerlaw with jdpileup model for the Pictor A core.

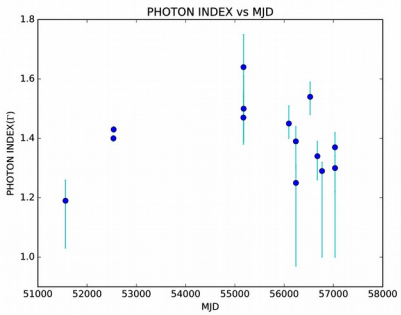


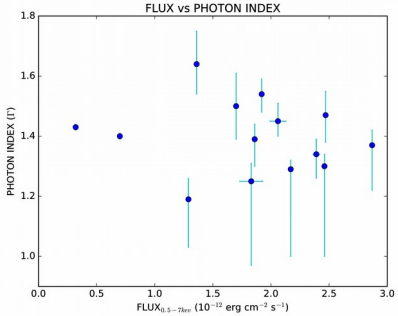


Obs.ID	MJD	Exp(ks)	Γ	Flux†	χ^2/DOF
346	51561	25.8	$1.23^{+0.08}_{-0.07}$	$1.34^{+0.06}_{-0.06}$	149/215
3090	52534	46.4	$1.40^{+0.01}_{-0.01}$	$0.42^{+0.00}_{-0.00}$	310/380
4369	52539	49.1	$1.43^{+0.01}_{-0.01}$	$0.32^{+0.00}_{-0.00}$	286/376
12039	55172	23.7	$1.47^{+0.09}_{-0.08}$	$2.47^{+0.00}_{-0.00}$	119/204
12040	55174	17.3	$1.64^{+0.10}_{-0.11}$	$1.36^{+0.00}_{-0.00}$	130/176
11586	55177	14.3	$1.50^{+0.11}_{-0.11}$	$1.70^{+0.02}_{-0.02}$	92/159
14357	56095	49.3	$1.45^{+0.05}_{-0.06}$	$2.06^{+0.07}_{-0.07}$	218/297
14221	56237	37.5	$1.39^{+0.09}_{-0.05}$	$1.86^{+0.01}_{-0.01}$	226/287
15580	56239	10.5	$1.25^{+0.28}_{-0.06}$	$1.83^{+0.10}_{-0.10}$	75/125
15593	56527	49.3	$1.54^{+0.06}_{-0.05}$	$1.92^{+0.00}_{-0.00}$	210/296
14222	56674	45.4	$1.34^{+0.08}_{-0.05}$	$2.39^{+0.03}_{-0.03}$	258/359
14223	56768	50.1	$1.29^{+0.29}_{-0.03}$	$2.17^{+0.00}_{-0.00}$	305/348
16478	57031	26.8	$1.37^{+0.15}_{-0.05}$	$2.87^{+0.01}_{-0.01}$	183/277
17574	57032	18.6	$1.30^{+0.30}_{-0.04}$	$2.46^{+0.01}_{-0.01}$	149/223

* Galactic column density was fixed at $4.12 \times 10^{20}\,\mathrm{cm}^{-2}$.
† 0.5–7.0 keV flux of the core in the units of $10^{-12}\,\mathrm{erg/cm^2/s}$.







Conclusions & Future work

- **The next step of the analysis will include updated PSF simulations including the pileup effect.**
- **With the properly characterized PSF shape, we will update the source (AGN) and the background (host galaxy, plus extended obes) regions, and perform a more detailed spectral modeling, constraining also the presence of the iron line in the source spectrum.**
- **The image deconvolution and the spectral modeling for the large-scale jet and the extended lobes will also be performed**