XMM-Newton Observation of 1ES 1615+061

Pablo Cassatella

Supervisor: Matteo Guainazzi

ESAC, 09/07/2007



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What's my study about?

The object 1ES 1615+061 is a Seyfert 1 galaxy that belongs to the class of the socalled Active Galactic Nuclei (see Nuria's talk). The main emission mechanism for these objects in the 0.5-10 keV range is the inverse-Compton scattering of optical/UV photons coming from the accretion disk off high-energy relativistic We have set of high-energy relativistic We have set of high-energy relativistic We have set of high-energy relativistic observations) different observations performed by *XMM-Newton* during 2004 and 2005 and

we will focus mainly on MOS data to study:

- Continuum emission
- Iron Kα emission line



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Pablo Cassatella/Pablo.Cassatella@sciops.esa.int

Spectral analysis





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- There's evidence (F-test) to state that two powerlaws fit the data better than just one powerlaw
- Two important emission lines are present at

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Comptonization model and two

-	Osservazione	kT_{plasma} (keV)	kT_{disco} (keV)	τ	$E_{\rm c}~({\rm keV})$	$I_c \text{ (fotoni cm}^{-2} \text{ s}^{-1}\text{)}$	χ^2/ u
-	0206450201	300 (fissato)	$(7.6^{+1.4}_{-2.9}) \ 10^{-2}$	$(5.2^{+0.4}_{-0.6}) 10^{-2}$	$6.1^{+0.1}_{-0.1}$	$(6.3^{+7.1}_{-4.8}) 10^{-6}$	148.4/115
	0206450101	300 (fissato)	$(7.5^{+1.6}_{-4.7}) \ 10^{-2}$	$(4.4^{+0.4}_{-0.5}) 10^{-2}$	$5.8^{+0.1}_{-0.1}$	$(2.02^{+1.0}_{-0.9}) 10^{-5}$	114.8/110
	0206450401	300 (fissato)	$(9.5^{+1.5}_{-7.1}) \ 10^{-2}$	$(7.6^{+1.1}_{-1.6}) 10^{-2}$	$5.3^{+0.1}_{-0.1}$	$(2.2^{\pm 1.5}_{-1.4}) 10^{-5}$	62.0/60
	0206450501	300 (fissato)	$(7.9^{+1.3}_{-5.9}) \ 10^{-2}$	$(4.9^{+0.4}_{-0.6}) 10^{-2}$	< 7.0	$< 8.6 10^{-5}$	111.1/101
_	0206450601	300 (fissato)	$(7.3^{+3.4}_{-6.3}) 10^{-2}$	$(3.3^{+0.5}_{-0.7}) 10^{-2}$	$6.7^{+0.1}_{-0.2}$	$(4.4^{+3.1}_{-3.1}) 10^{-5}$	164.6/156

This model shows that:

- kT_{disk} are consistent ($\propto M_{BH}^{-1/4}$)
- the optical depths vary





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Comptonization model and a

Letting kT_{plasma} and kT_{disk} vaky we the total kJ_{isk}= (7.5) 10²/ke' -2/1 = 625.3/ The optical depths are not consistent for the first four observations, but they are for the last one.

This suggest variability in timescales which have to be longer than the duration of each operation

(around 5000 ks) but shorter t





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Conclusions

1ES 1615+061 is a **standard** Seyfert 1:

- Non-thermal continuum
- X-ray spectrum explained by Comptonization of disk photons around a supermassive black hole
- But it is also **peculiar** relativistic disk line profile? – Relativistic effects:
 - •Orbiting spot on the disk?`
 - Variability timescale highlighted



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Future work

- Study of the Hardness Ratios, ie. F(0.3-2 keV)/F(2-10keV) vs time
- Study of this object among the Seyfert 1 population



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