Relativistic Fe Kα line in bright Seyfert 1 galaxies

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Shining from the heart of darkness:
Black hole accretion and jets

17 October 2016
X-ray Emission
X-ray emission

The X-ray analysis is a fundamental key to probe the innermost regions of the AGNs.

- Continuum power law
- Fluorescence emission lines
- Compton Hump

Reynolds et al. 1995
Open Questions
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Sample of Seyfert 1 objects observed with Suzaku
IC 4329A

Significance between 2-4σ for single observation

Model:
zwabs*(pexrav+zgauss)

Mantovani et al. 2014
IC 4329A

Model: zwabs*(pexrav +zgauss+Laor)

Mantovani et al. 2014
Detections for counts $> 4 \times 10^4$
Relativistic Iron Ka line common feature in AGN

Model: pexrav+zgauss+relline

Mantovani et al. 2016
Relativistic Pexmon

Nandra et al. 2007

Fe Kα (6.4 keV), Fe Kβ (7.06 keV) flux 11.3% of Kα, Ni Kα (7.47 keV) flux 5% of Kα

Compton Reflection (pexrav)

Fe Kα Compton shoulder

Fe Kα flux linked to Compton Hump

In general, the Pexmon model gives similar fit to the data compared to the phenomenological one

Mantovani et al. 2016
Relativistic Pexmon

MCG +8–11–11

\[ \Delta \chi^2 / \Delta \text{d.o.f.} > 123/1 \]

IC 4329A

\[ \Delta \chi^2 / \Delta \text{d.o.f.} > 57/1 \]

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Relativistic Pexmon

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Low Energy Cutoff?

Mantovani et al. 2016
Relativistic Pexmon

IC 4329A $\Delta \chi^2/\Delta$ d.o.f. > 57/1

Mantovani et al. 2016
Evidence for light bending in MCG -6-30-15 and NGC 4051

NuSTAR spectra

Mantovani et al., in prep
Evidence for light bending in MCG -6-30-15 and NGC 4051

- Strong Fe line (EW~300 eV)
- High reflection fraction (R>1)

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Gravitational Light bending effects

Mantovani et al., in prep
Light Bending effects

Miniutti & Fabian 2004
Light Bending effects

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Evidence for light bending in MCG -6-30-15 and NGC 4051

Mantovani et al., in prep
Conclusions

• Relativistic Fe line ubiquitous in Seyfert 1

• Both narrow and broad Fe line tracing emission of the Compton hump

• Thanks to NuSTAR, we were able to constrain the size of the Comptonizing region in NGC 4051 and MCG -6-30-15