Relativistic Fe Kα line detection in the *Suzaku* spectra of IC 4329A

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(Very simple) physical idea

- Direct power-law
- Reflection Spectrum
- Observer
Previous work

Broad iron lines are expected to be a widespread feature in the bright AGN

- Nandra et al. 2007 \( \rightarrow \) 30% no relativistic line
- de La Calle Pérez et al. 2010 \( \rightarrow \) 20% no relativistic line
- Bhayani & Nandra 2011 \( \rightarrow \) Relativistic effects can explain

Still in some sources relativistic component is missing
IC 4329A is the second brightest Seyfert 1, after NGC 4151, with a flux of:

\[ F \sim 2 \times 10^{-10} \text{erg s}^{-1} \text{cm}^{-2} \]

Five Suzaku observations in 2007 on August 1, 6, 11, 16, 20 with an exposure of \( \sim 26 \) ks each.

Total exposure of \( \sim 130 \) ks.
Data/Model Ratio

Strong narrow line

Model: zwabs*pexrav

Friday, 26 September 14
Data/Model Ratio

Strong narrow line

and broad line?

Model: zwabs*pexrav
Spectral Variability

Gamma vs Continuum 2-10 keV

Gamma vs Continuum 2-10 keV * 10^10
Spectral Variability

Gamma vs Continuum 2-10 keV

Reflection Fraction vs Equivalent Width

R consistent with a narrow line?
Spectral Variability

R consistent with a narrow line?

Broad component?

Reflection Fraction vs Equivalent Width

Gamma vs Continuum 2-10 keV
Data/Model Ratio

Significance between 2-4σ for single observation

Model: zwabs*(pexrav+zgauss)
Data/model Ratio

Model: zwabs*(pexrav+zgauss)

\sim 5.5\sigma \text{ significance}
Pexmon model

- 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

Nandra et al. 2007
Data/model Ratio

Evidence for a Fe XXVI narrow emission line (6.94 keV)

Model:
zwabs*(cutoffpl+pexmon+kdblur2*pexmon)
Evidence for a Fe XXVI narrow emission line (6.94 keV)

Model:
zwabs*(cutoffpl+pexmon+kdbblur2*pexmon)
Summary

Missing relativistic component in AGN?

• Brightest Seyfert: IC 4329A
• Narrow component in single short observation
• Relativistic component in the combined spectra with high significance
• Data consistent with the narrow and the broad iron line components tracking the Compton Hump.

Very high signal-to-noise ratio is required to disentangle relativistic line components in AGN