Accretion tomography & X-ray reverberation

Localizing the X-ray emission in AGN

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X-ray reverberation: Ingredients

- Observer sees both direct and reflected emission
- Variability time-scale $\rightarrow$ size measure.
X-ray reverberation: Ingredients

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X-ray reverberation: Ingredients

- Observer sees **both** direct and reflected emission
- Variability time-scale → size measure.
'Seeing' Fe K reverberation

- MCG-5-23-16: An optimum target.
Seeing Fe K reverberation
Lag-energy lags explained!

NGC 4151

MCG-5-23-16

NGC 7314

Spectrum

Total

Direct

Reflection

Tomography & X-ray reverberaton.

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Compton hump & NuSTAR
MCG -5-23-16

- Sum $1.235 \, r_g < r < 100 \, r_g$
- $1.235 \, r_g$
- $2 \, r_g$
- $3 \, r_g$
- $4 \, r_g$
- $5 \, r_g$
- $10 \, r_g$
- $20 \, r_g$

(normalized counts s$^{-1}$ keV$^{-1}$)

Energy (keV)
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Shorter time-scales

fitted model


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Summary

Lag-energy spectra measure reflection fraction

Time-scale $\rightarrow$ size measure