Accretion tomography & X-ray reverberation

Localizing the X-ray emission in AGN

Abdu Zoghbi (U. Maryland, JSI)

Chris Reynolds, Ed Cackett, Erin Kara, Andy Fabian, Fiona Harrison ...

Zoghbi et al. 2014. ApJ, accepted. arXiv1405.367Z

X-ray reverberation: Ingredients

- Observer sees both direct and reflected emission
- Variability time-scale ⟶ size measure.

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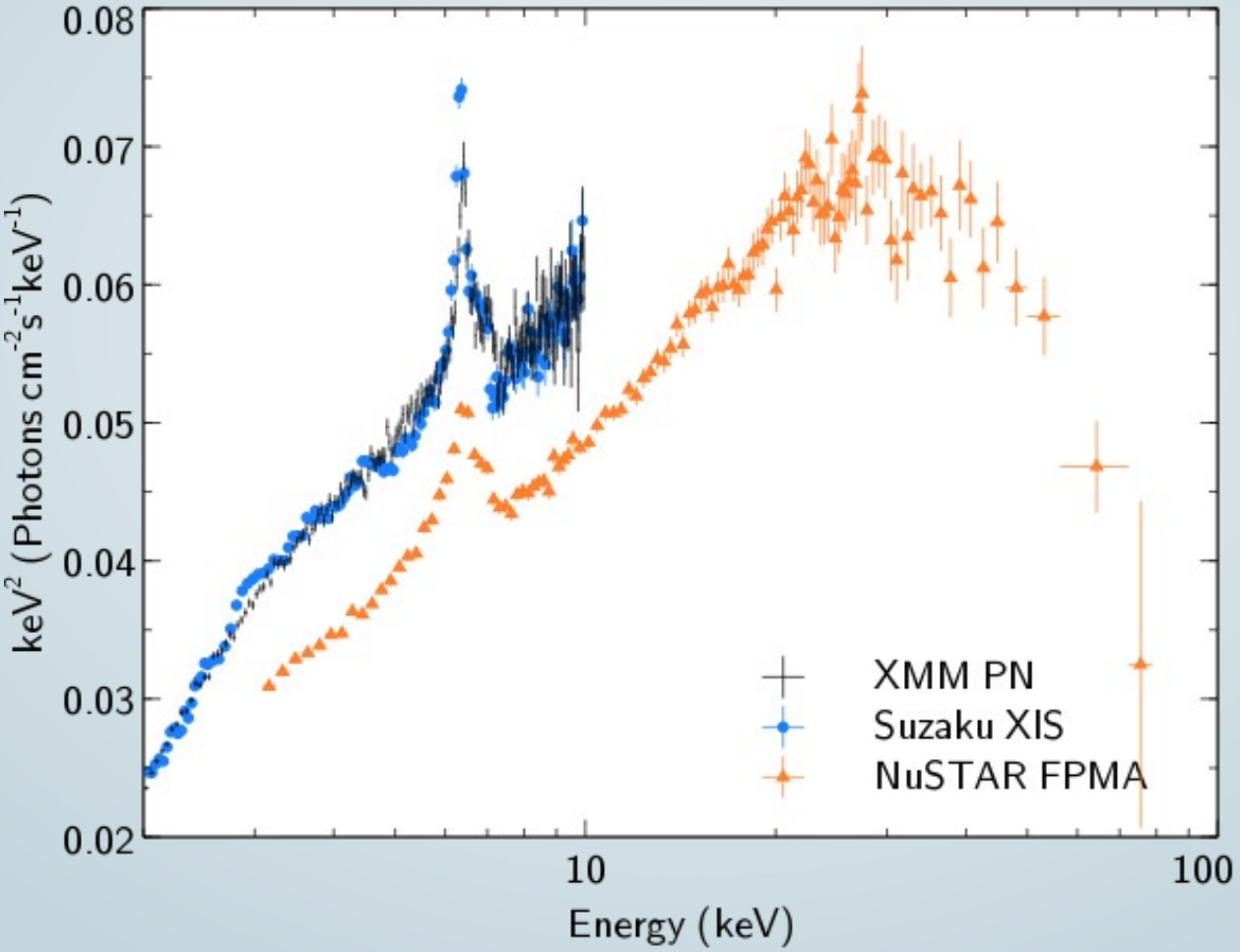

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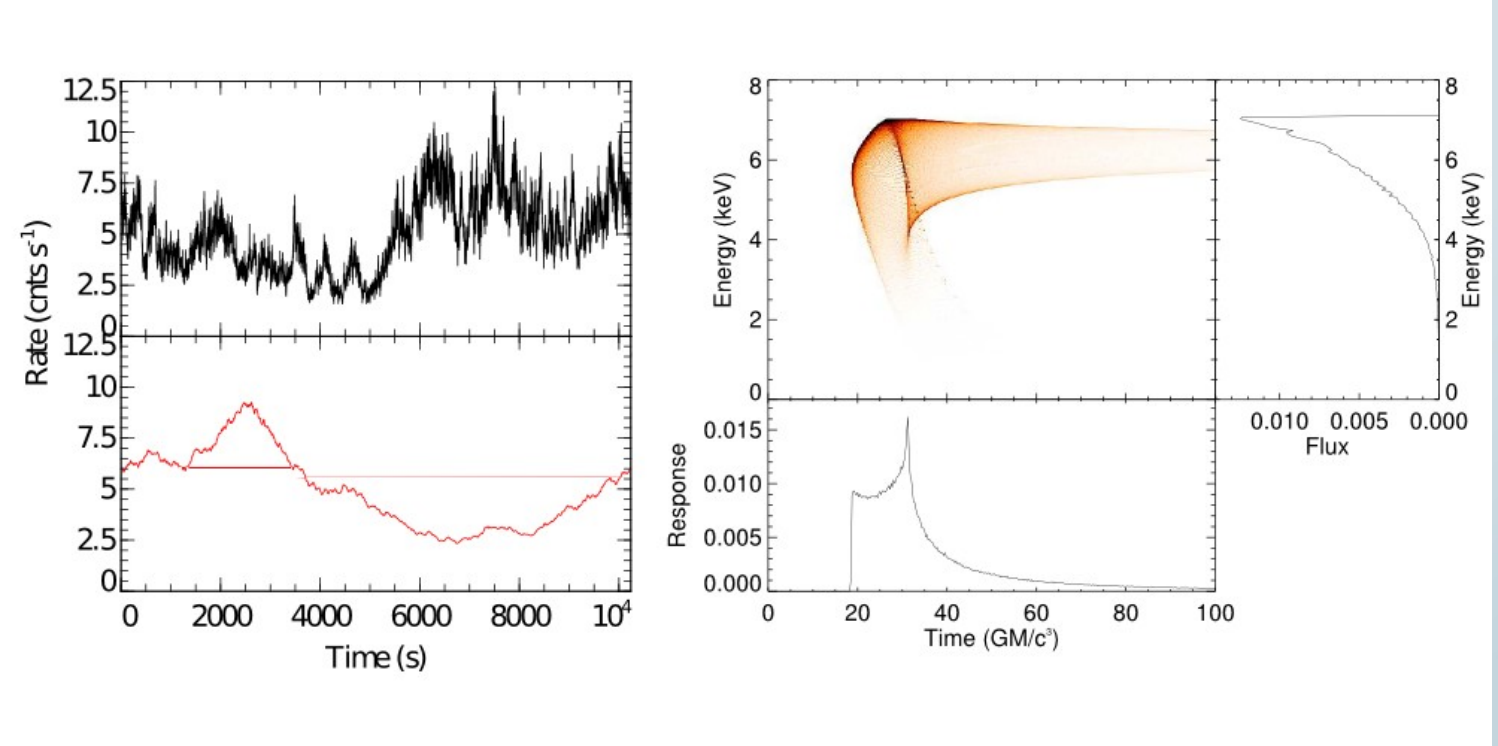
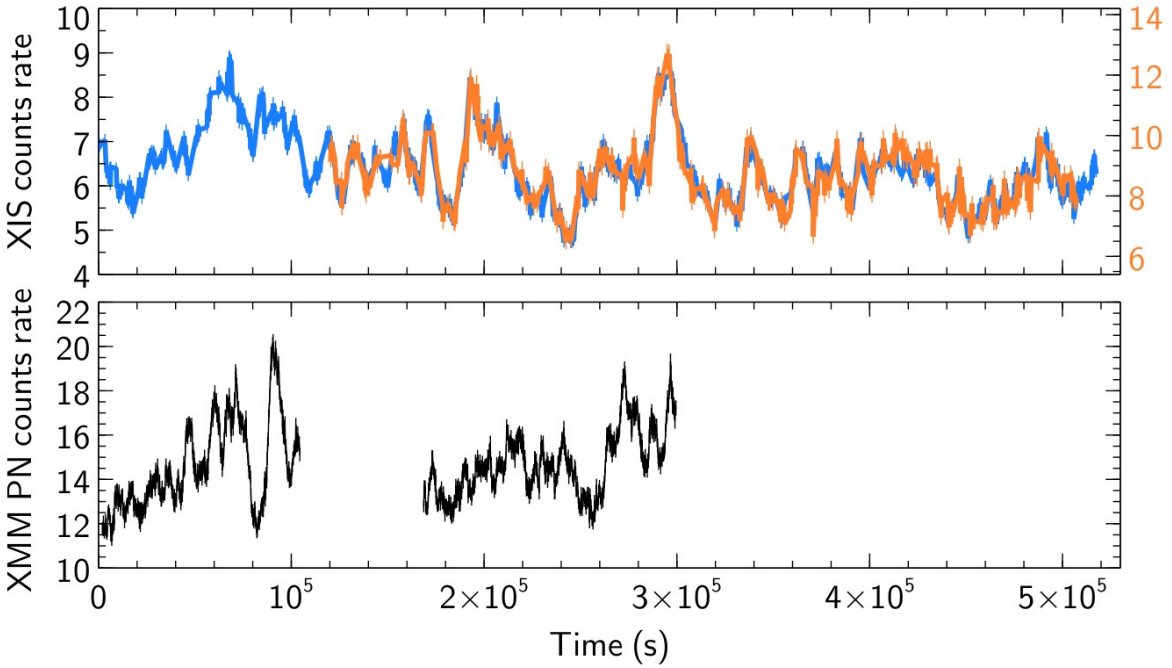
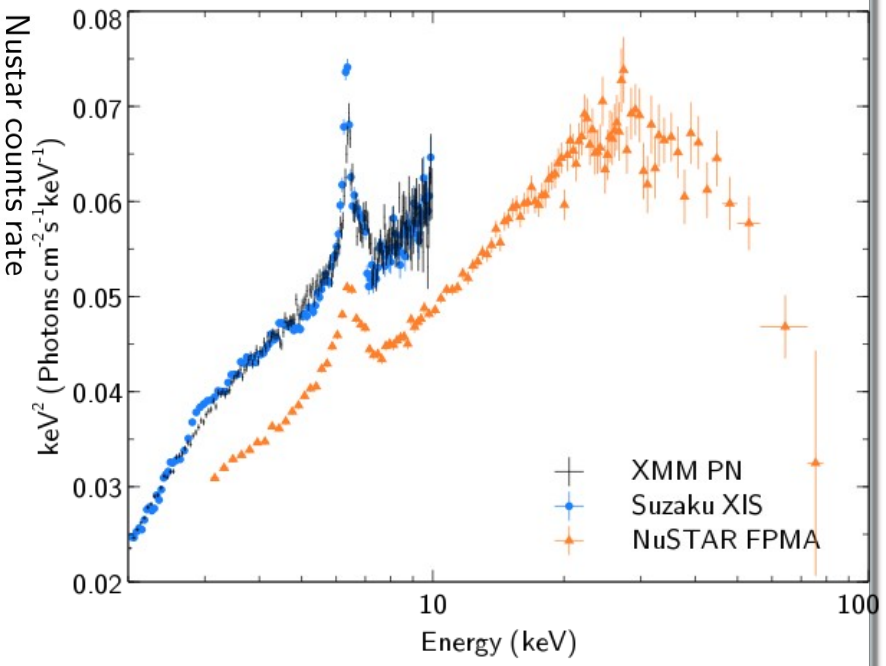


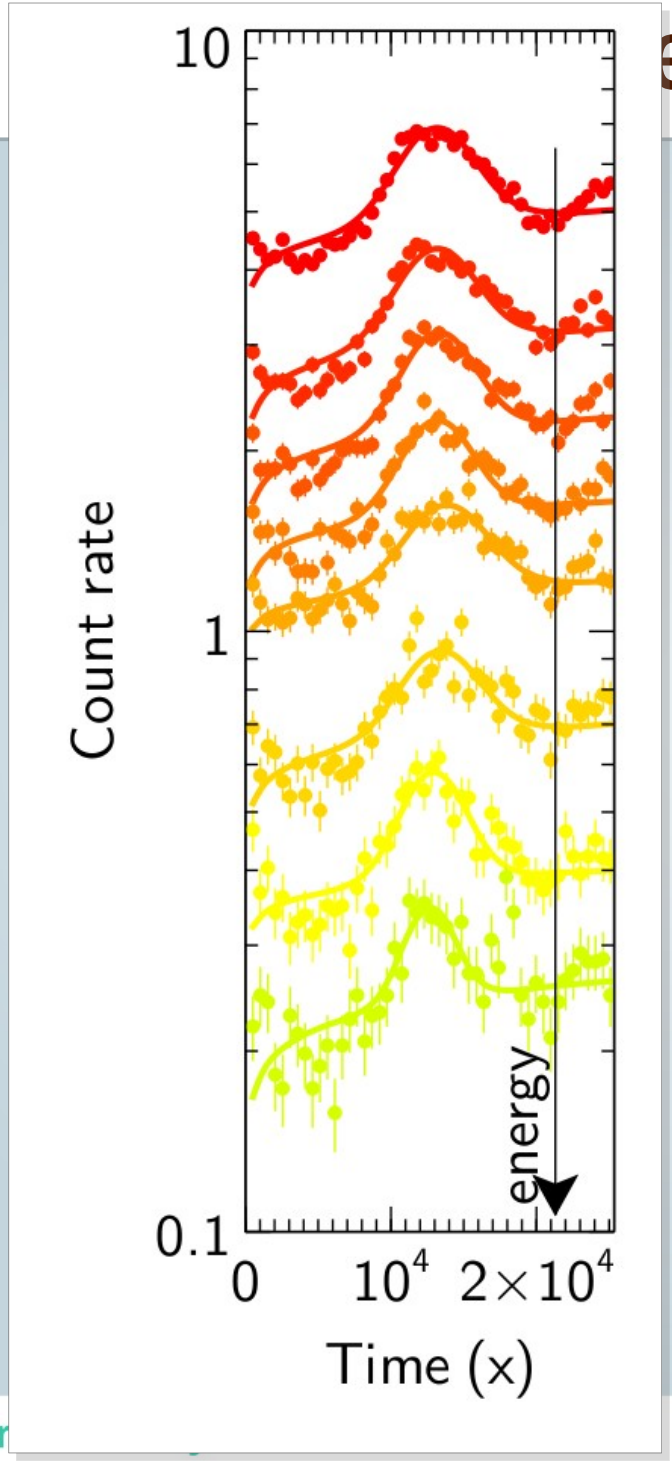
'Seeing' Fe K reverberation

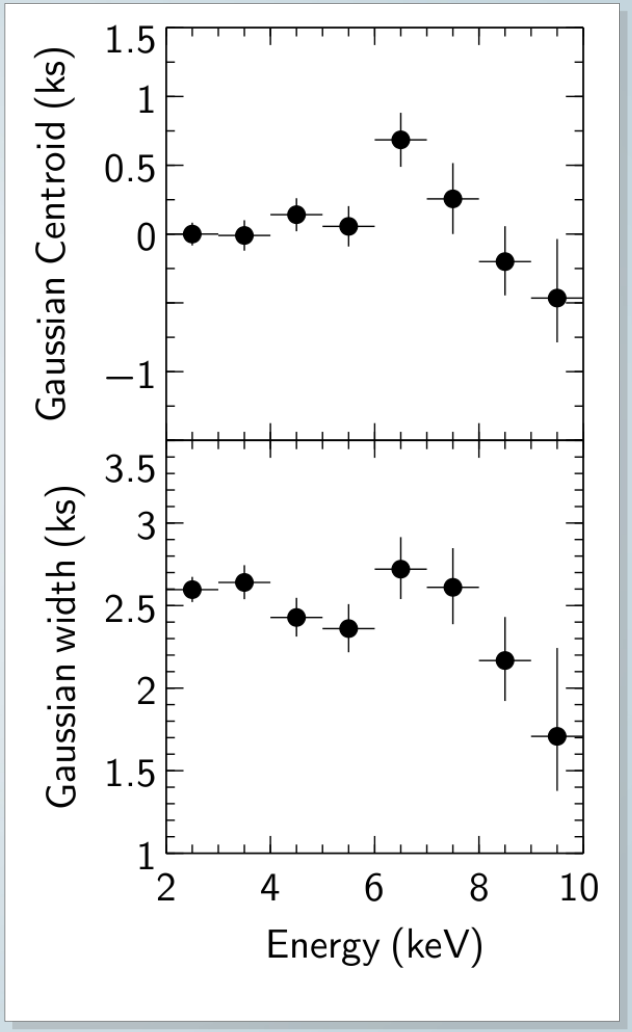
- MCG-5-23-16: An optimum target.





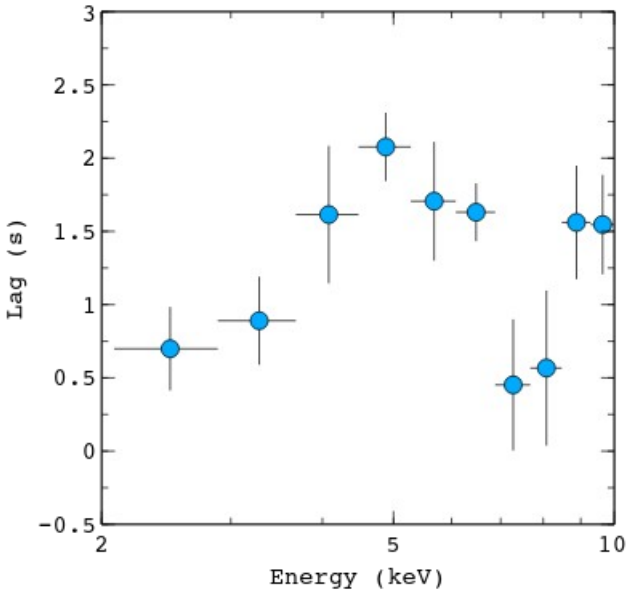
e K reverberation



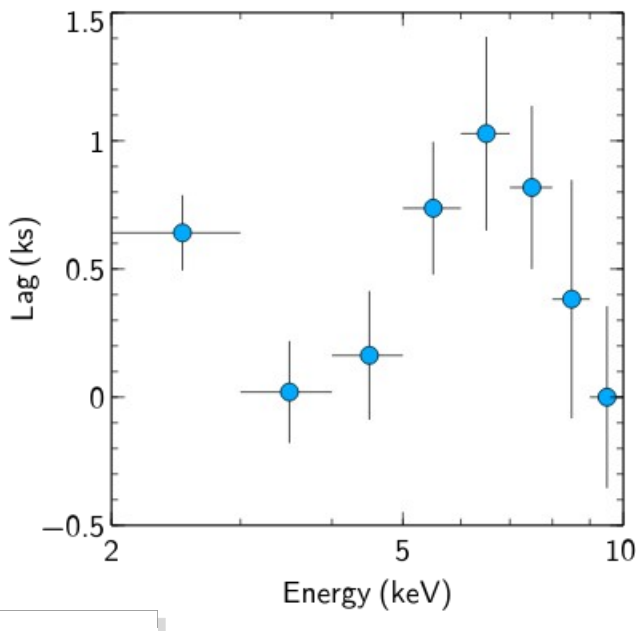


Lag-energy lags explained !

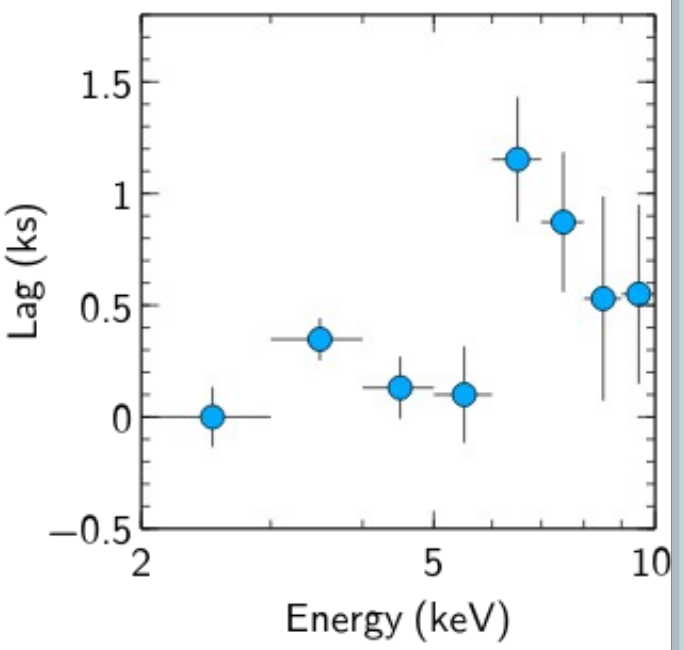
NGC 4151

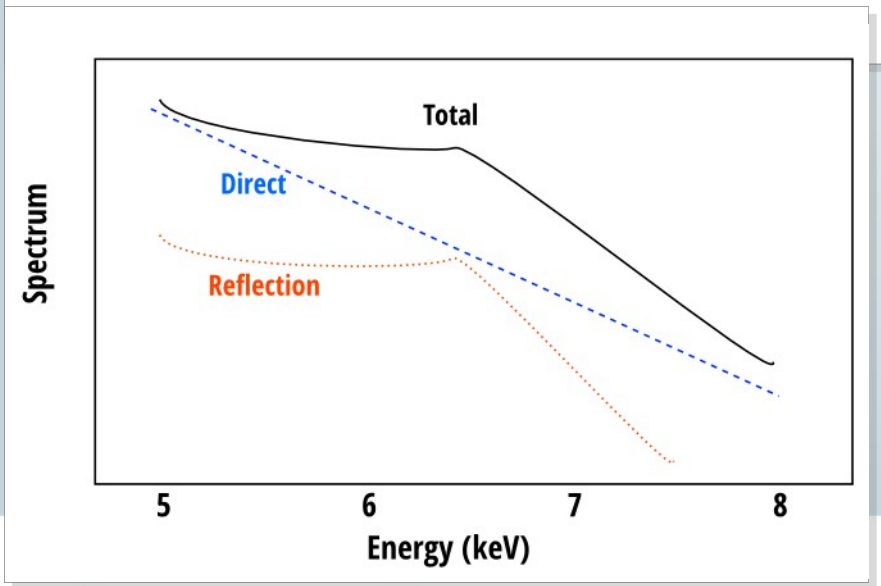


MCG-5-23-16

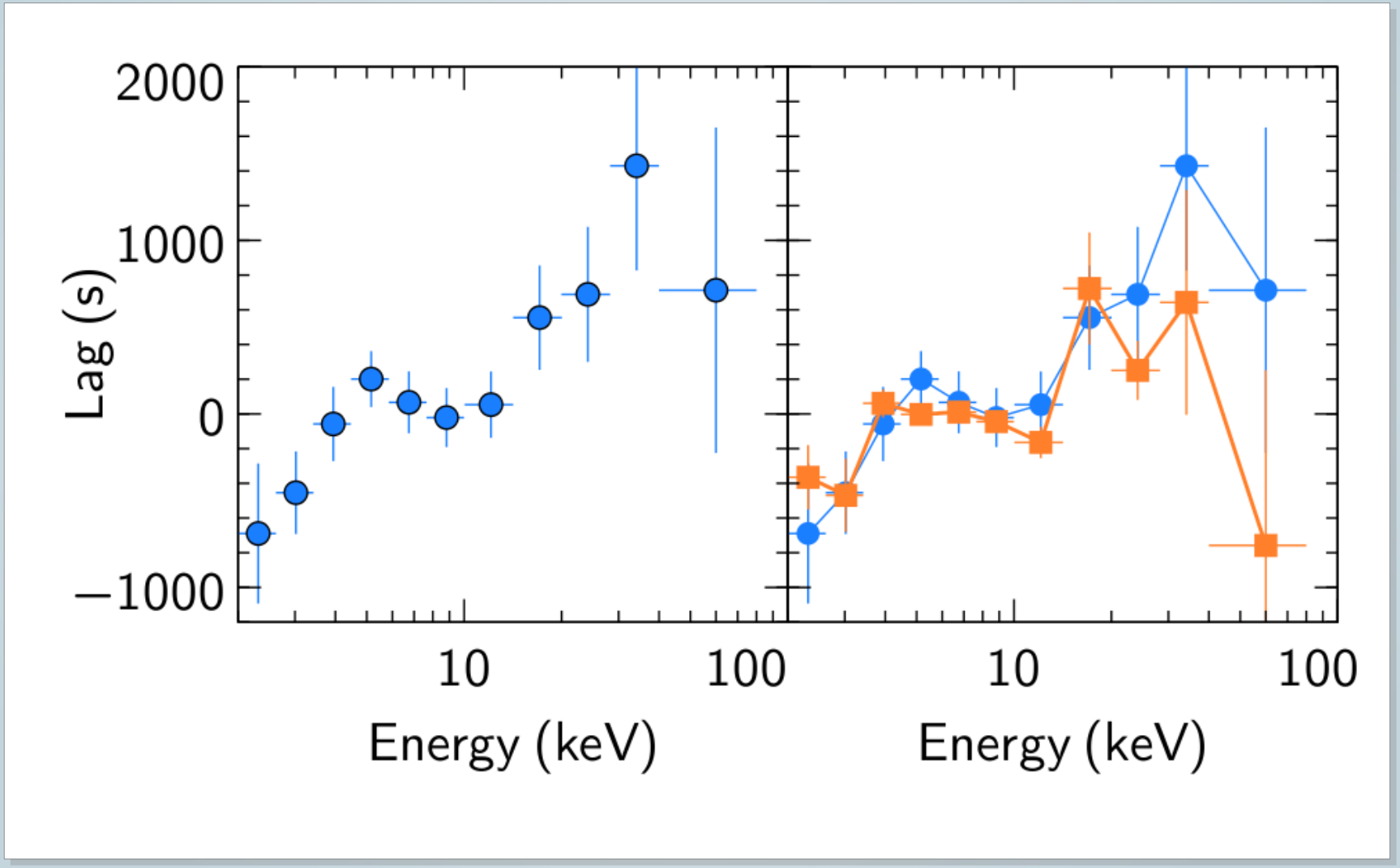


NGC 7314

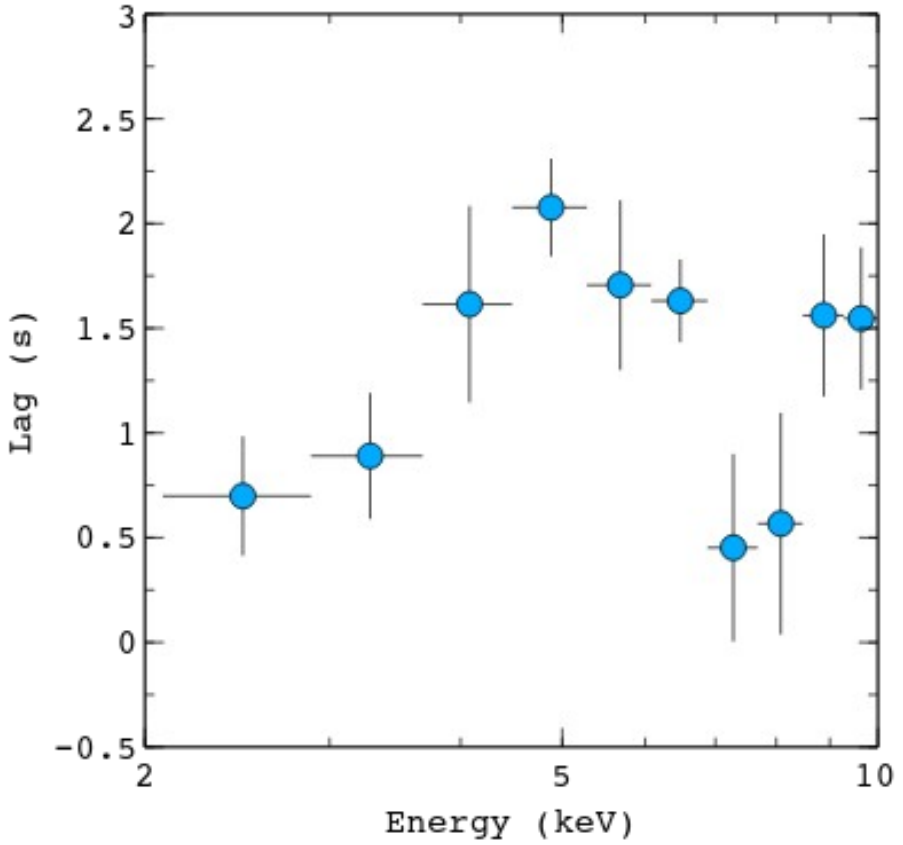


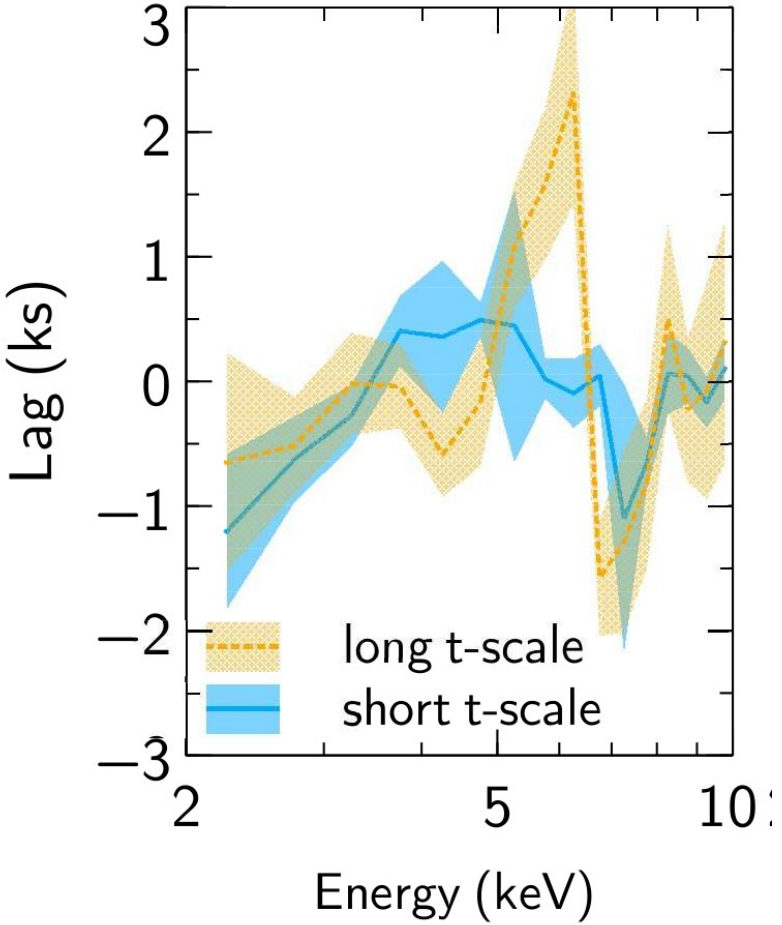


Compton hump & NuSTAR

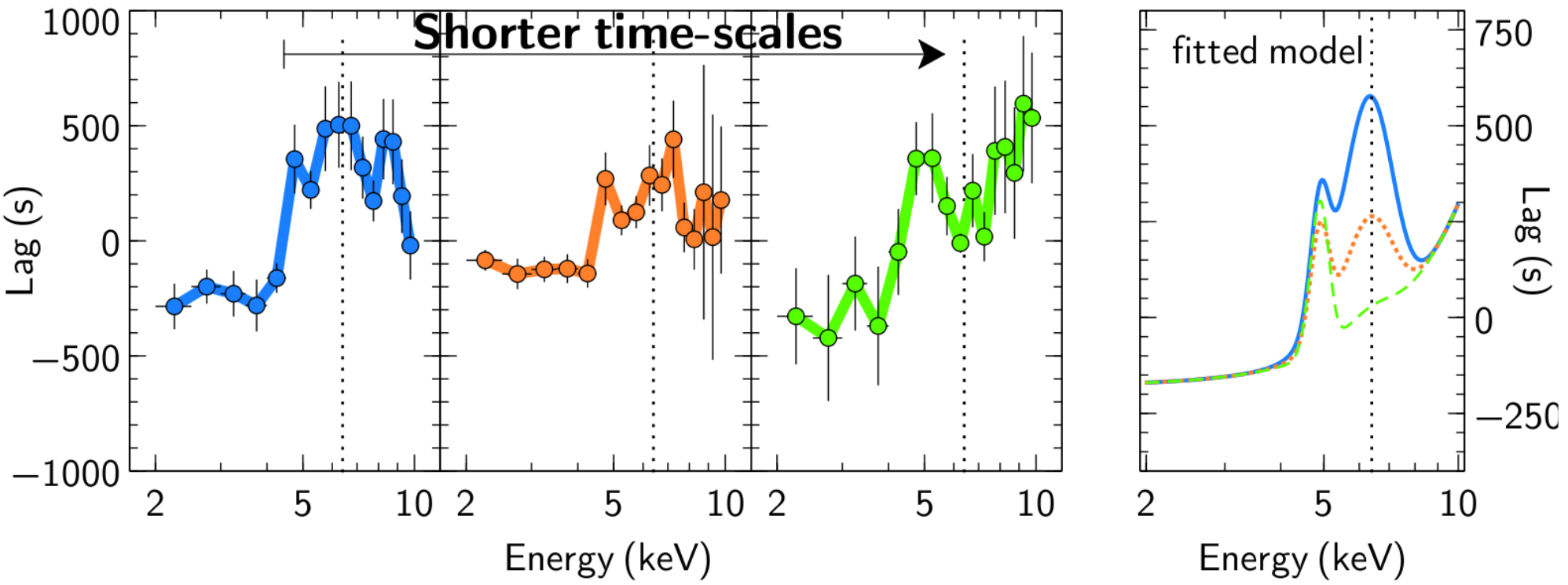


NGC 4151

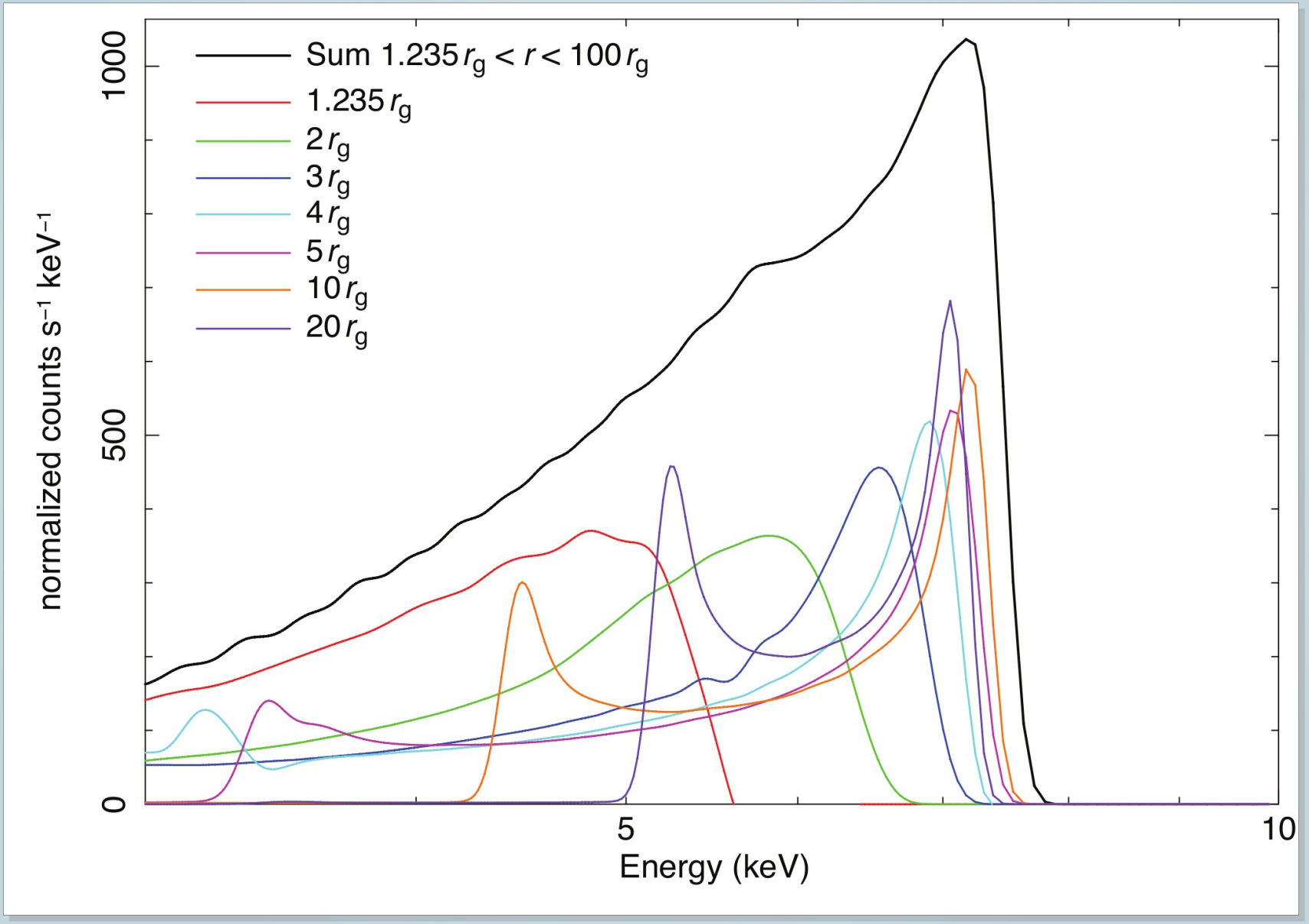




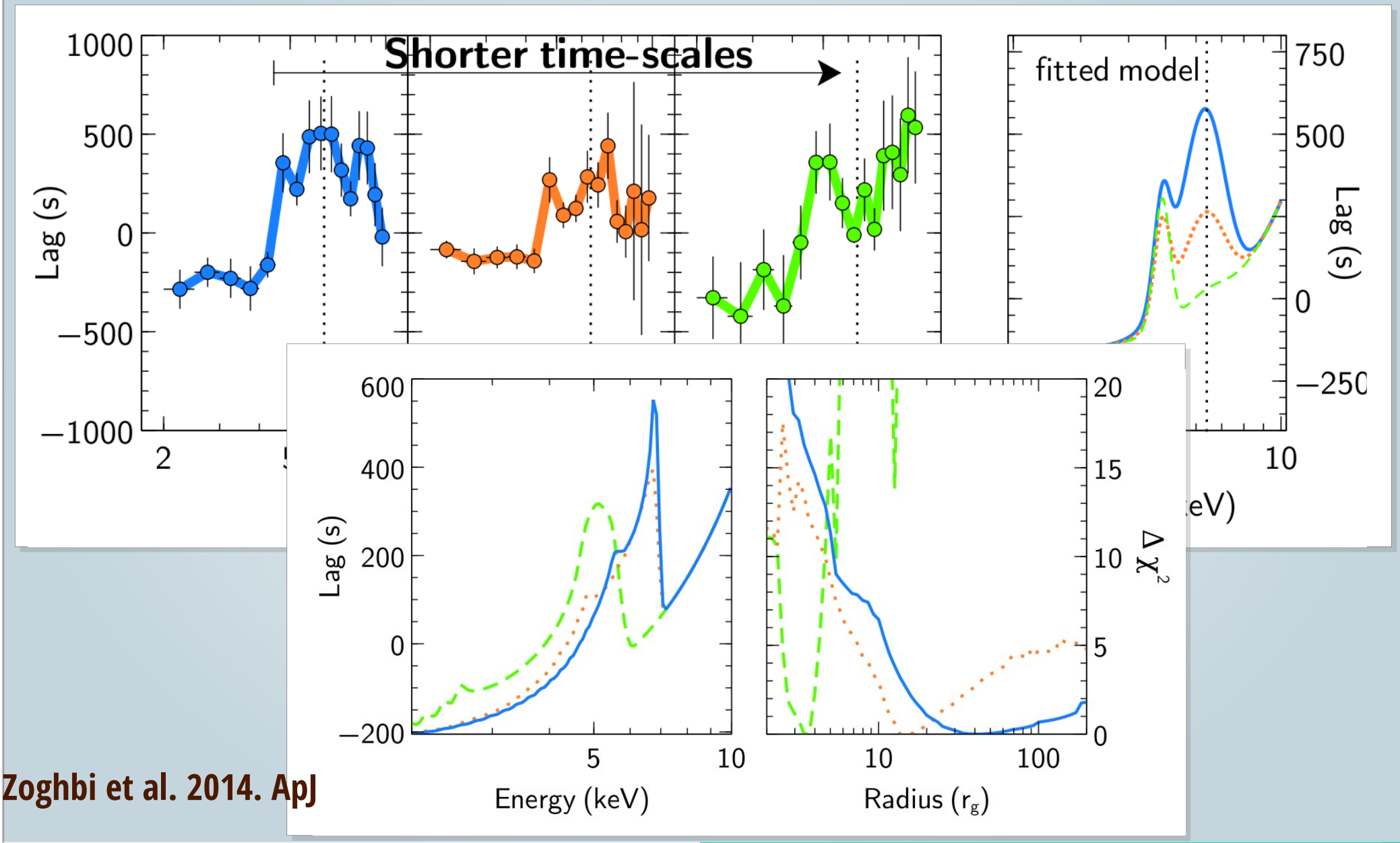
MCG -5-23-16


Shorter time-scales
1000
500
0
−500
−1000
Lag (s)
2
5
10
Energy (keV)
fitted model
750
500
0
−250
Lag (s)

MCG -5-23-16

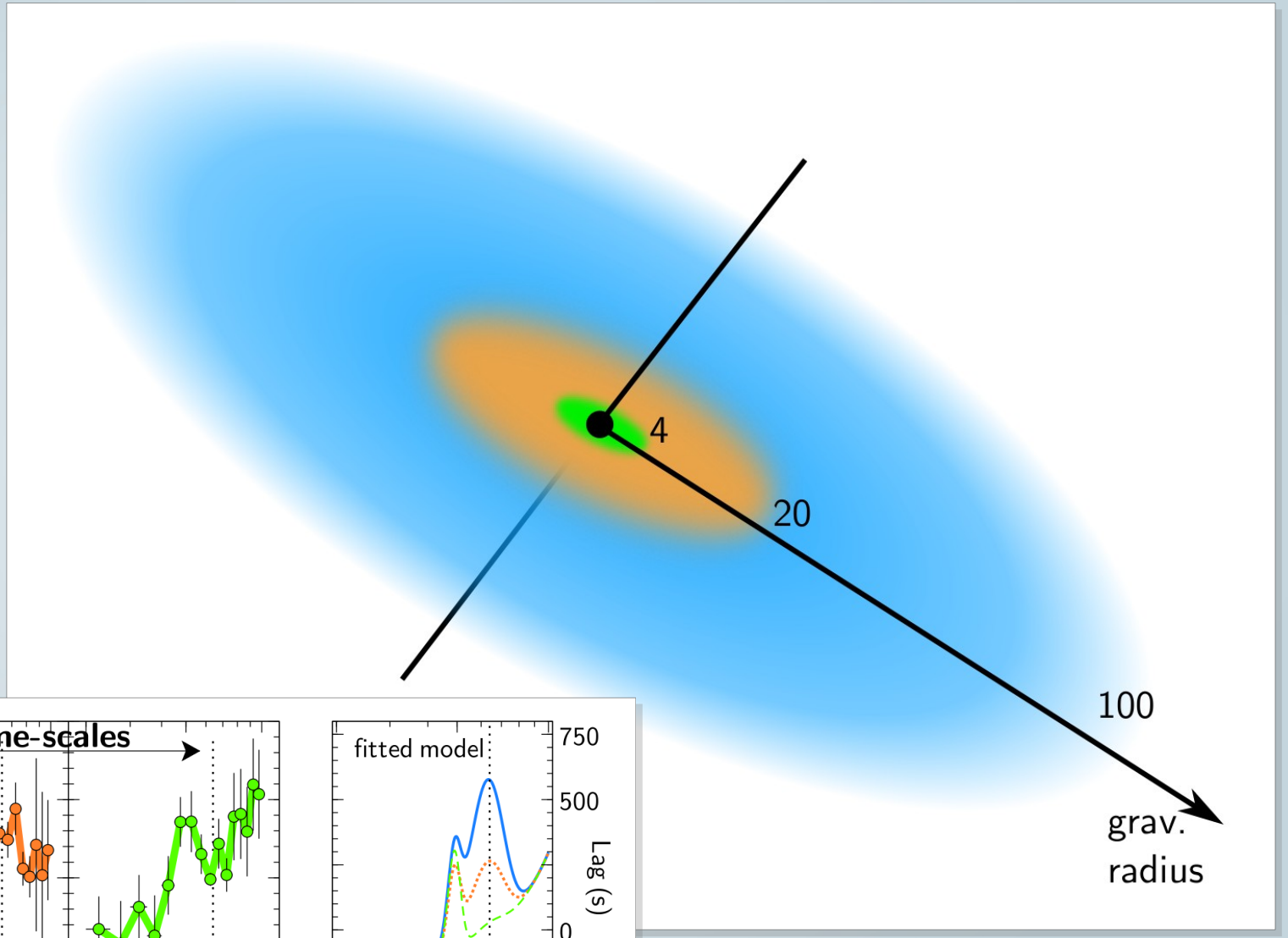

Sum 1.235 r_g < r < 100 r_g
1.235 r_g
2 r_g
3 r_g
4 r_g
5 r_g
10 r_g
20 r_g
normalized counts s^{-1} keV^{-1}
0
500
1000
5
10
Energy (keV)

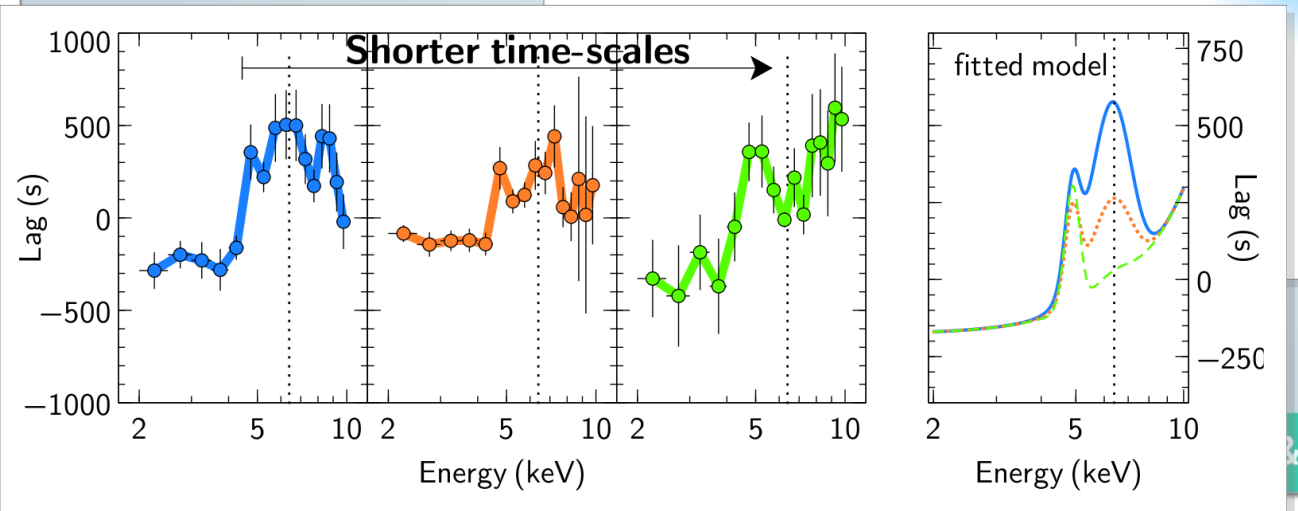
MCG -5-23-16



Zoghbi et al. 2014. ApJ

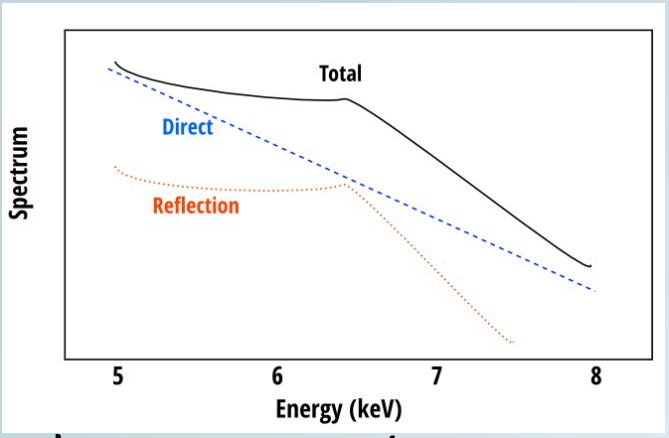
MCG -5-23-16



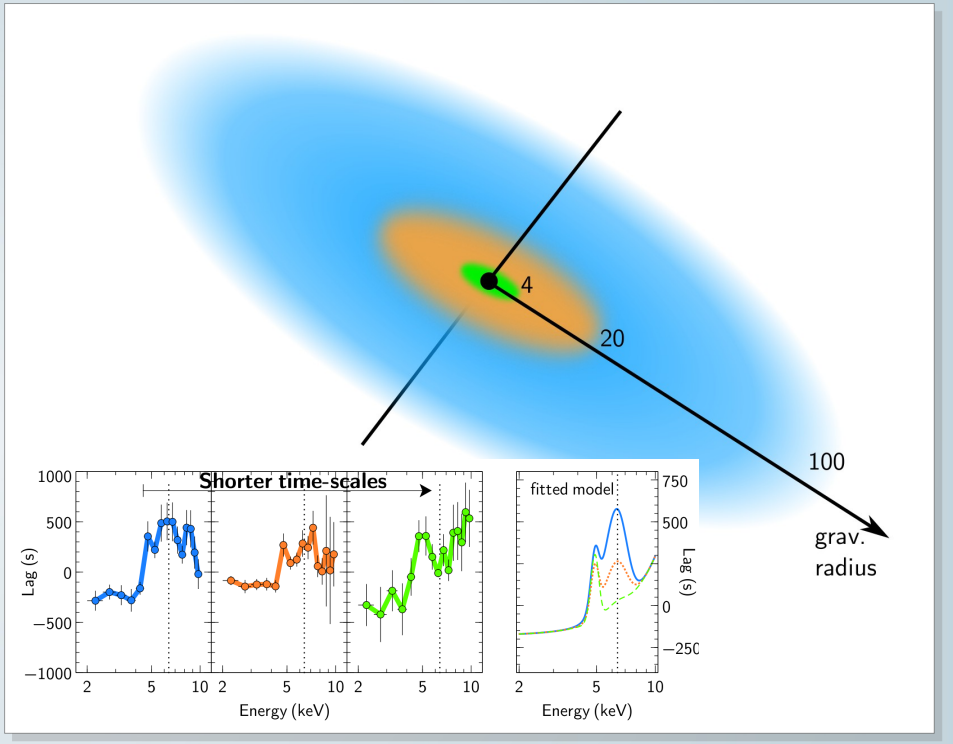


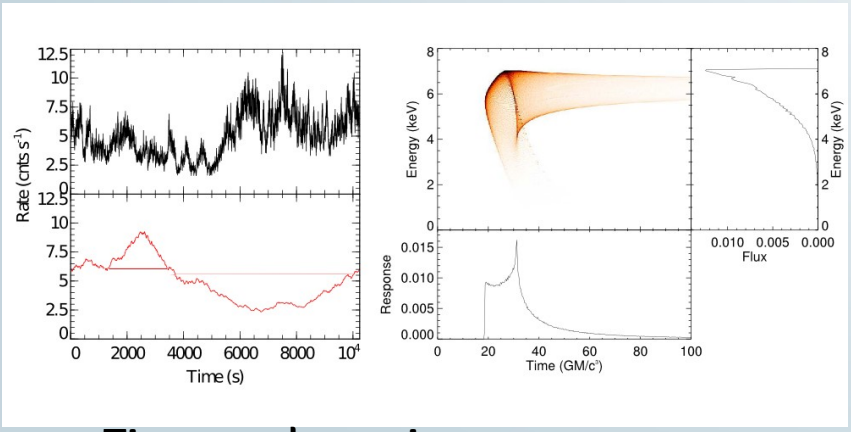
& X-ray reverberaton. A. Zoghbi

Summary



Lag-energy spectra measure reflection fraction





Time-scale → size measure