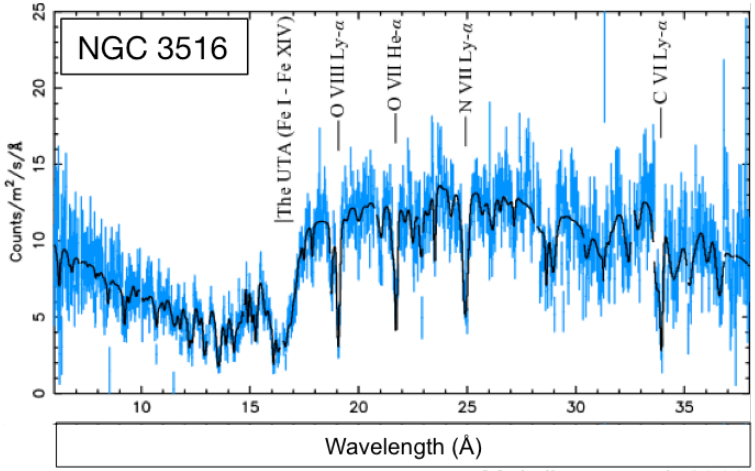
Spectral-timing analysis of warm absorbers in AGN

Catia Silva, Elisa Costantini & Phil Uttley

The warm absorber

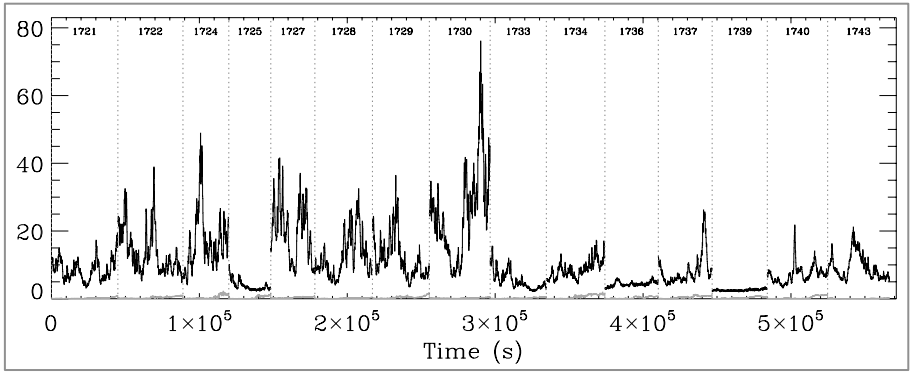


Mehdipour et al. 2010

AGN feedback?

Measuring the gas density allows to estimate the location of the WA and its output power

Variability and warm absorber response

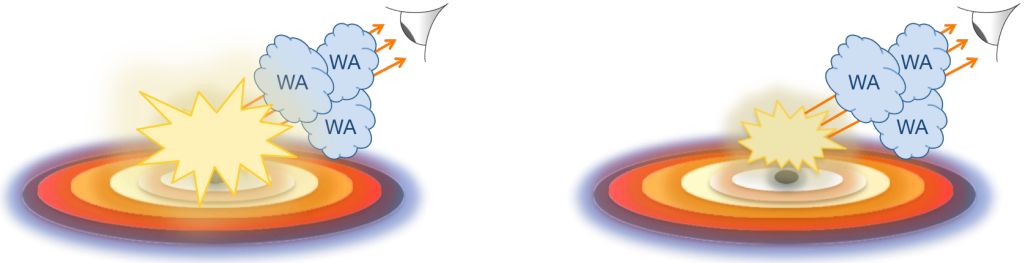


Vaughan et al. 2011

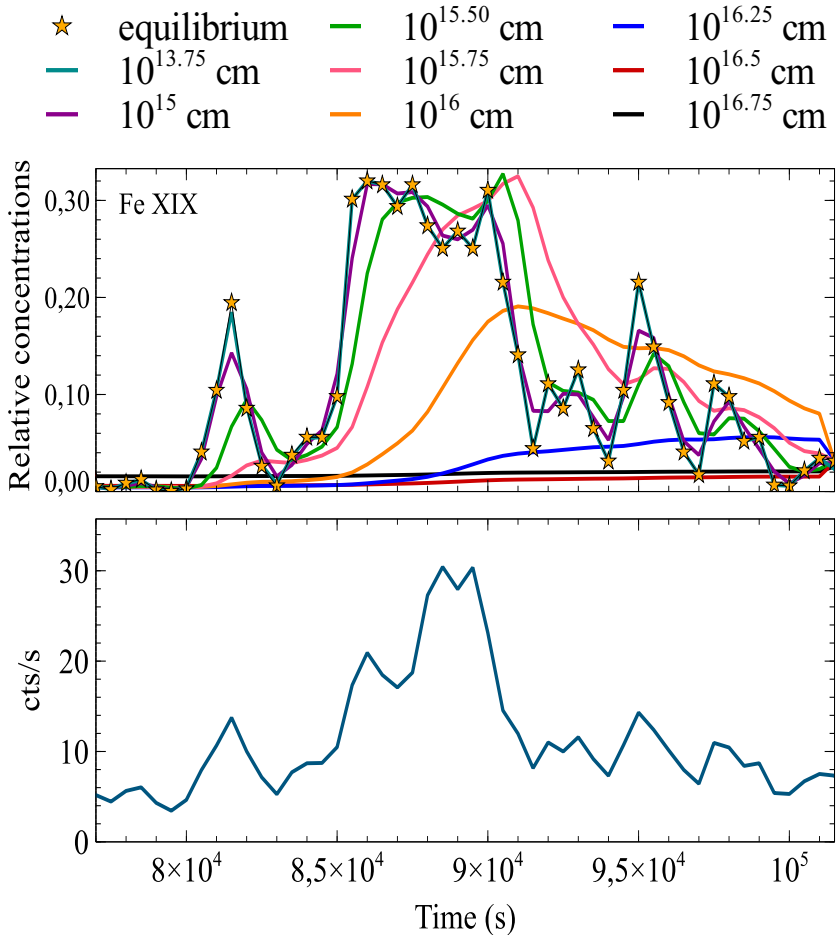
The time the gas takes to reach equilibrium with the ionizing continuum is dependent on n_e

$$t_{rec} \propto n_e^{-1}$$

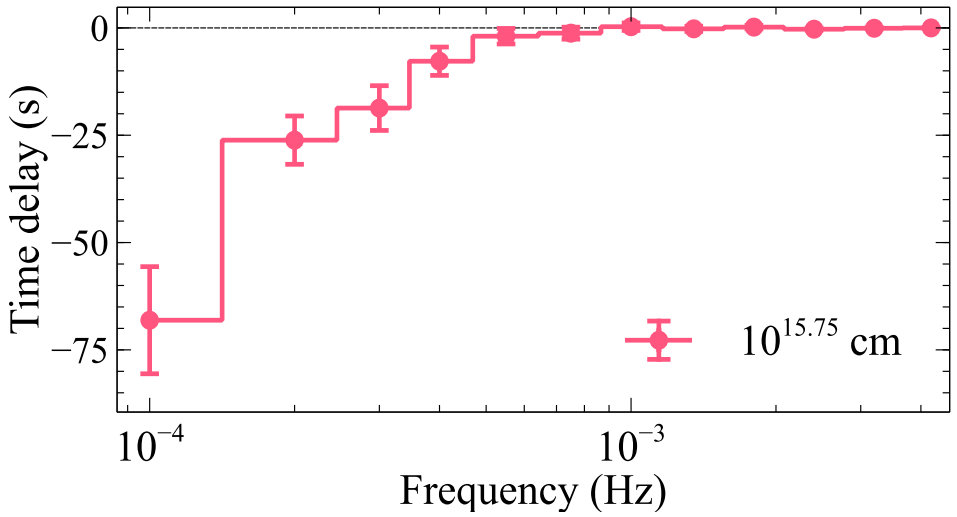
Krolik & Kriss 1995, Nicastro et al. 1999



Time-dependent photoionization



Time lag due to response time



✓ WA may be responsible for a significant soft lag at long timescales

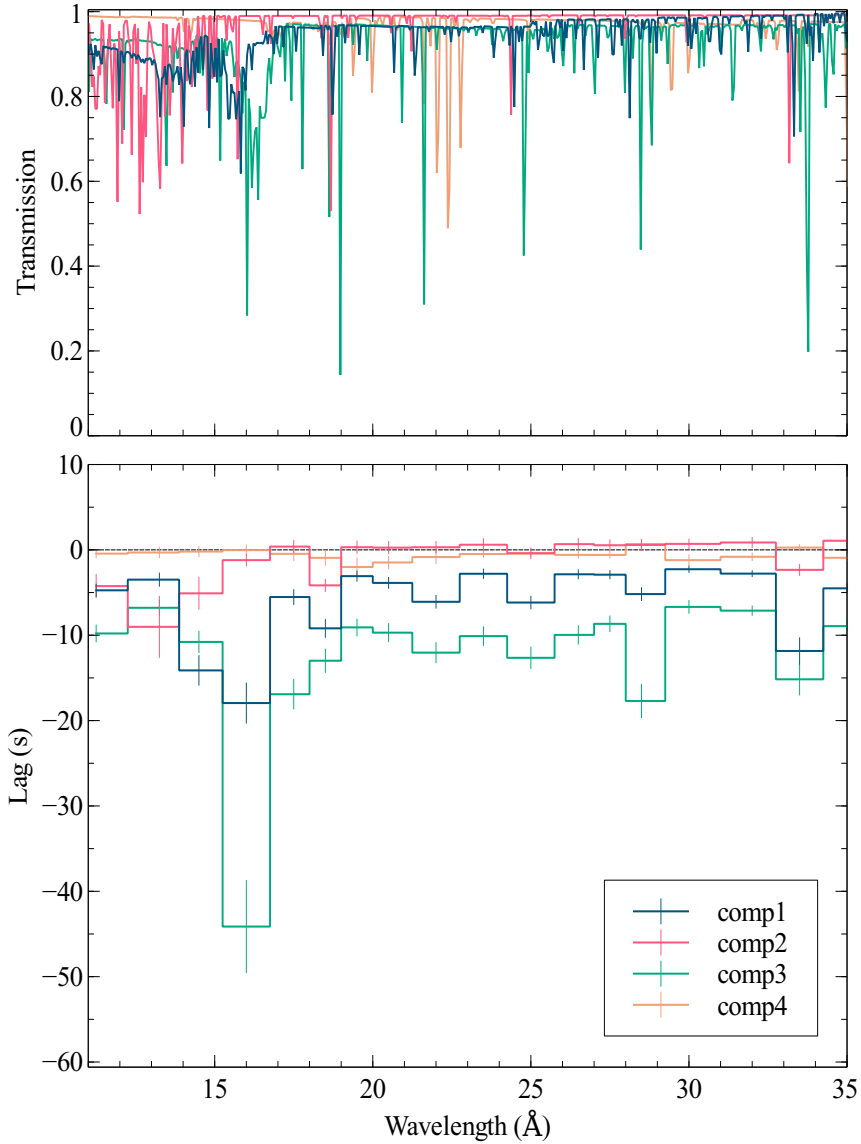
Silva, Uttley & Costantini (submitted to A&A)

Maximum effect at 0.3 – 1x10^{16} cm

Comparable to distance of broad line region and in agreement with previous studies on the location of the warm absorber for NGC 4051 (Nicastro et al. 1999, Krongold et al. 2007, Pounds & King 2013)

WA is likely to affect the observed lags

Lag-energy spectrum for simulated RGS data



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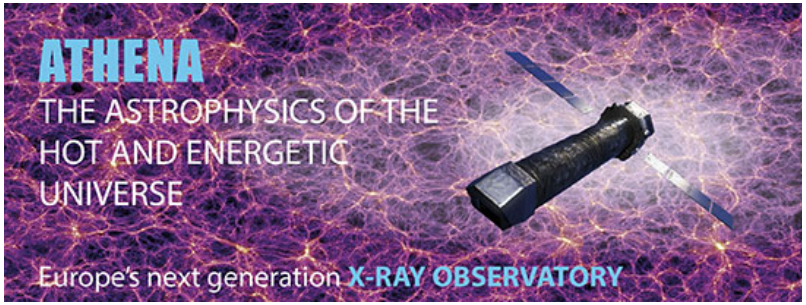
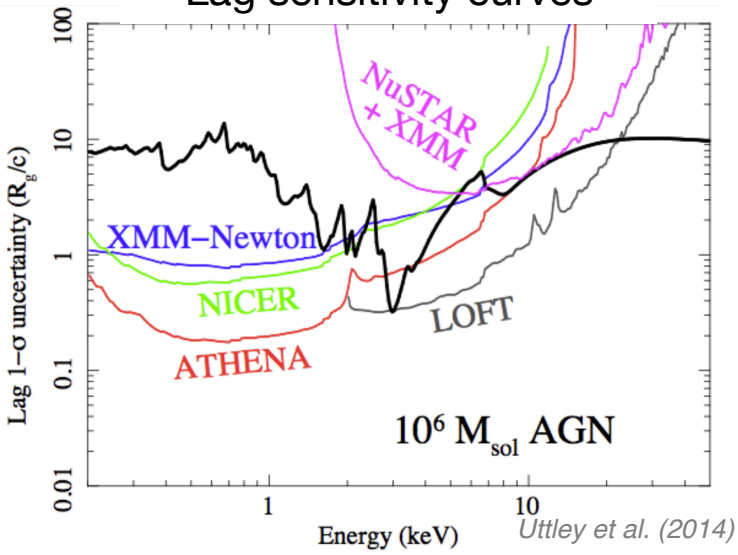
Future prospects



- High resolution
- Large effective area

Lag sensitivity curves



Uttley et al. (2014)

Mapping AGN outflows in exquisite detail with spectral-timing techniques