

Anatomy of the AGN in NGC 5548: Discovery of a fast and massive outflow

Jelle Kaastra

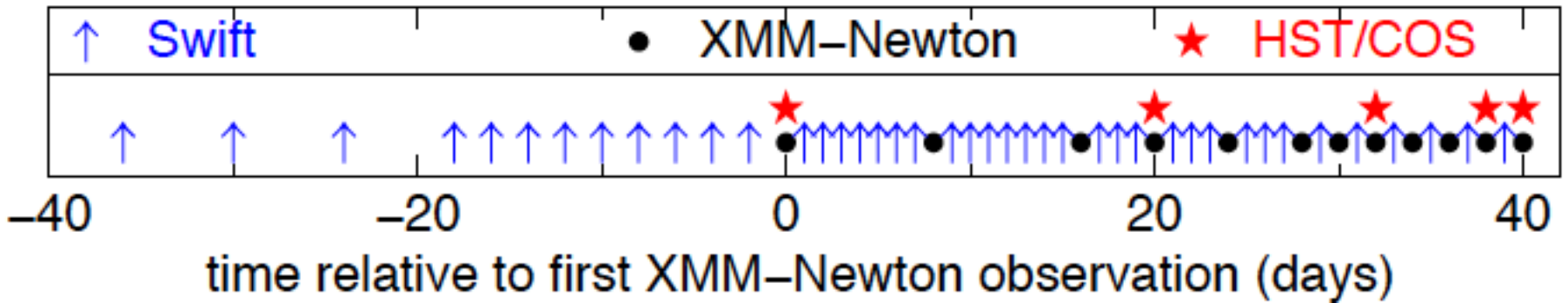
Jerry Kriss, Massimo Cappi, Missagh Mehdipour, Pierre-Olivier Petrucci, Katrien Steenbrugge, Nahum Arav, Ehud Behar, Stefano Bianchi, Rozenn Boissay, Graziella Branduardi-Raymont, Carter Chamberlain, Elisa Costantini, Justin Ely, Jacobo Ebrero, Laura Di Gesu, Fiona Harrison, Shai Kaspi, Julien Malzac, Barbara De Marco, Giorgio Matt, Paul Nandra, Stéphane Paltani, Renaud Person, Brad Peterson, Ciro Pinto, Gabriele Ponti, Francisco Pozo Nuñez, Alessandra De Rosa, Hiromi Seta, Francesco Ursini, Cor de Vries, Dom Walton, Megan Whewell

Why a campaign on NGC 5548?

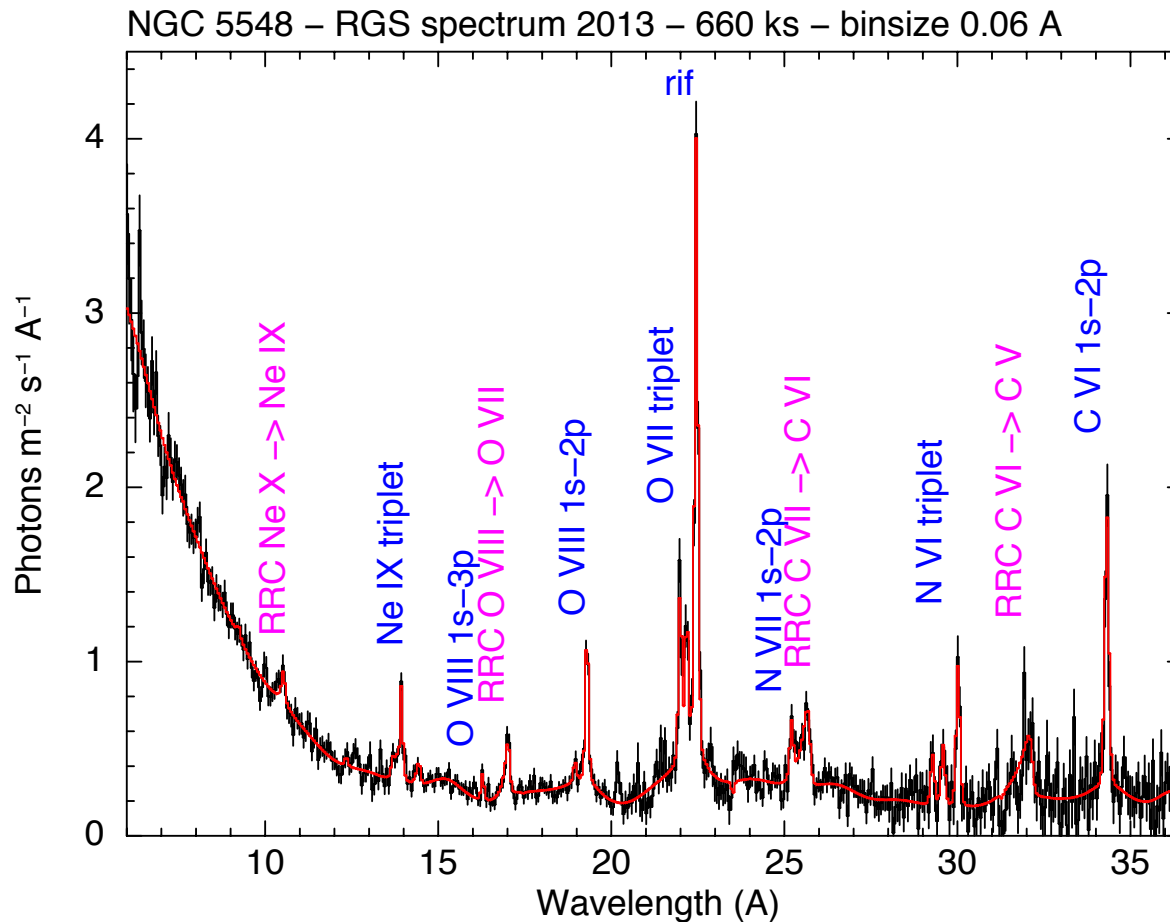
- AGN outflows: feedback for galaxy evolution
- How do outflows work?
- How much mass & energy?
- Key quantity: distance outflow
- Outflow response to changes $L \rightarrow$ distance
- Successful campaign on Mrk 509 in 2009
- Time for another target: NGC 5548
- One of two best studied Seyfert 1 galaxies (2400 publications over half a century)

Set-up campaign

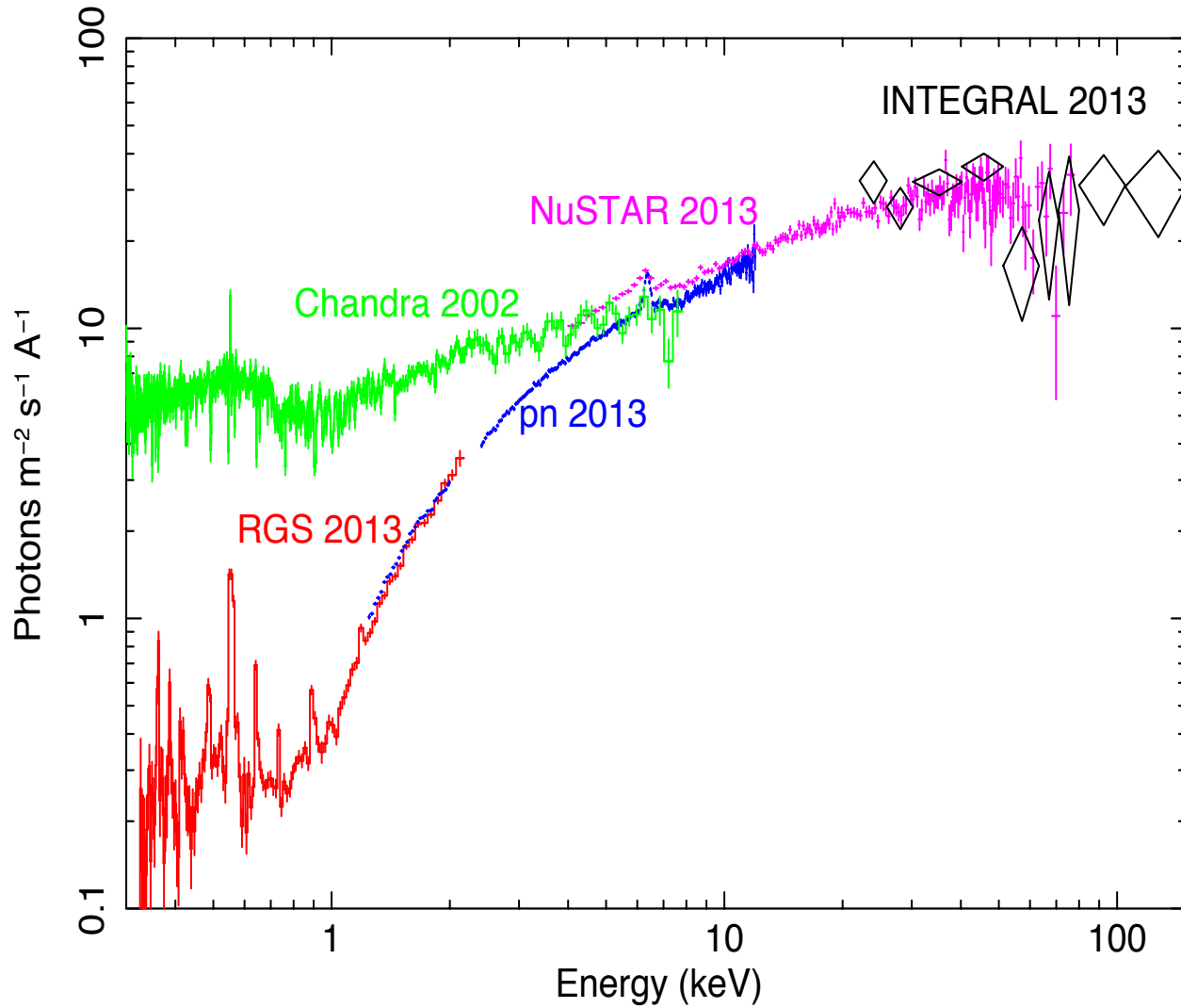
- 14 x 50 ks with XMM-Newton (RGS, EPIC, OM)
- 6 x HST/COS
- 4 x NuSTAR
- 4 x INTEGRAL
- 3 x Chandra LETGS
- Daily Swift monitoring (XRT, UVOT)
- Ground-based support (Israel, Chile)
- Core June/July 2013, 2 observations $\frac{1}{2}$ year later



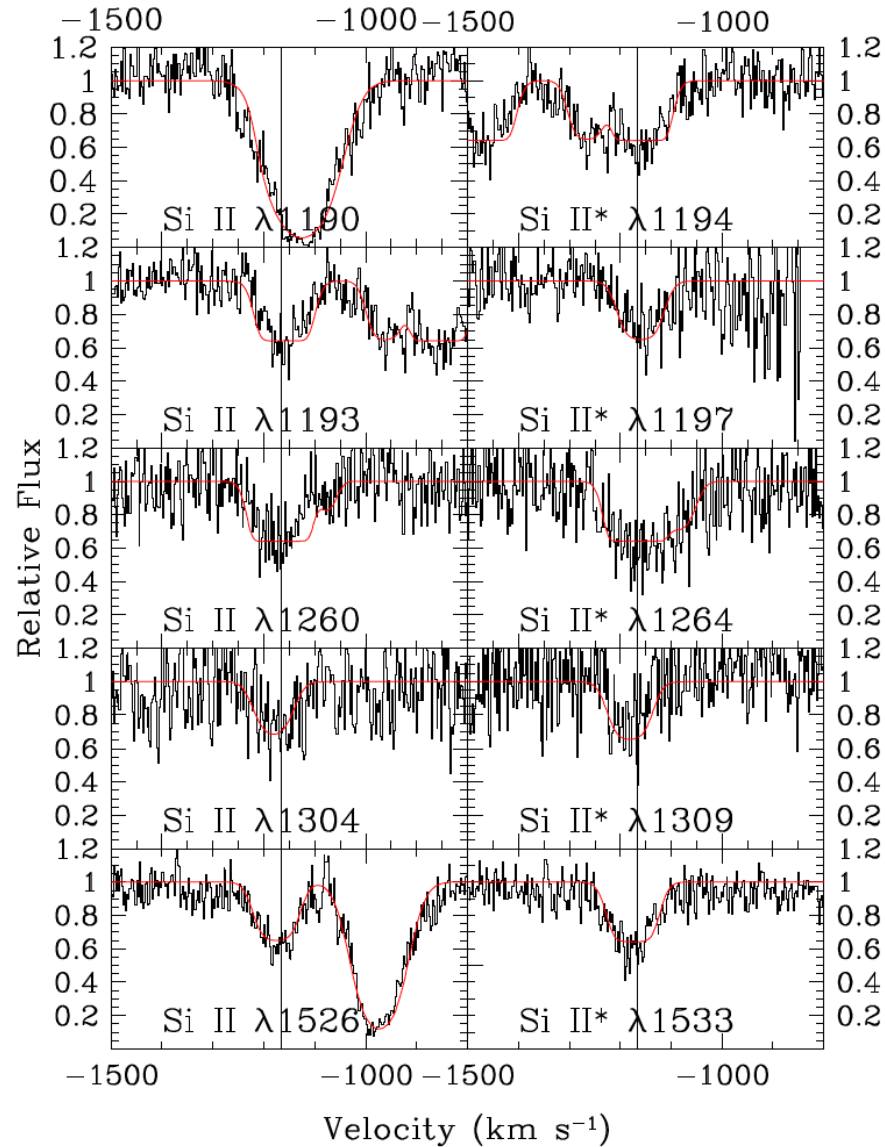
Surprise: very low soft X-ray flux



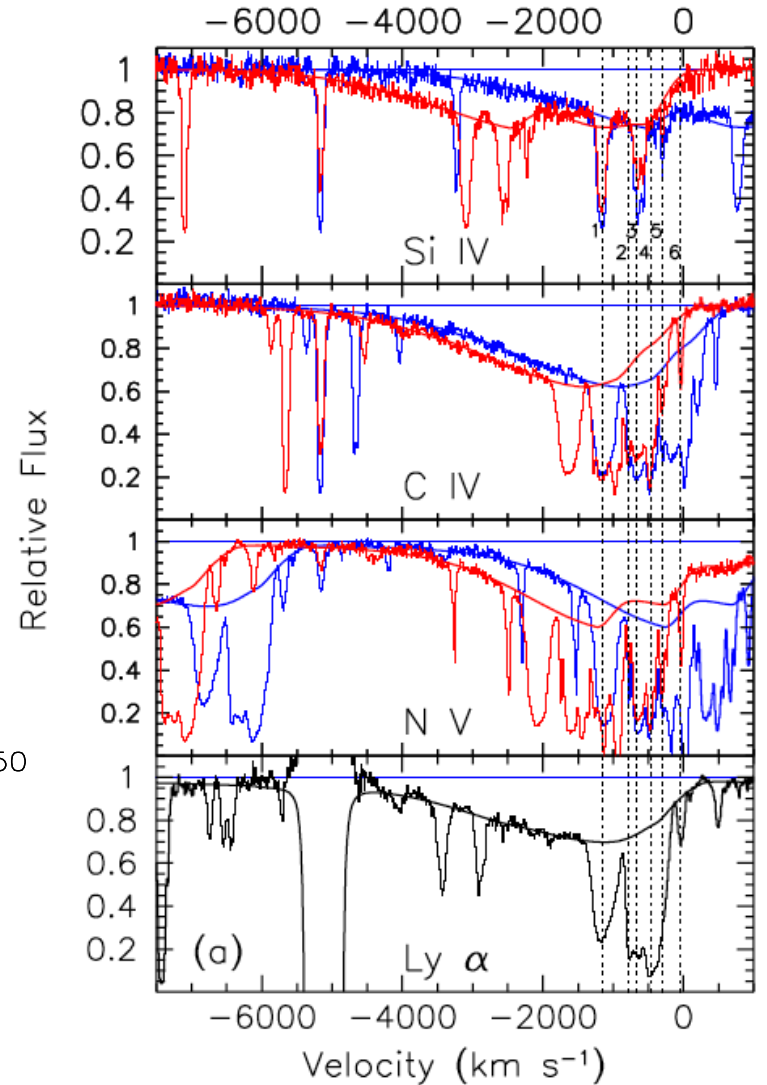
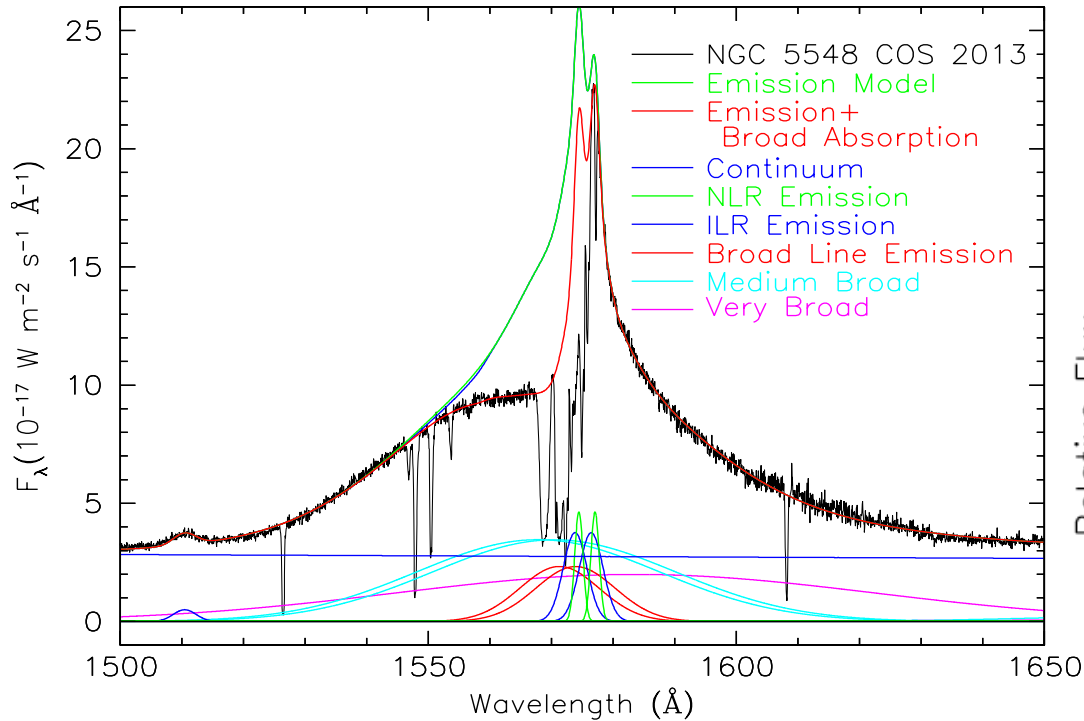
Strong absorption but normal high-E flux



Appearance of lowly ionised gas



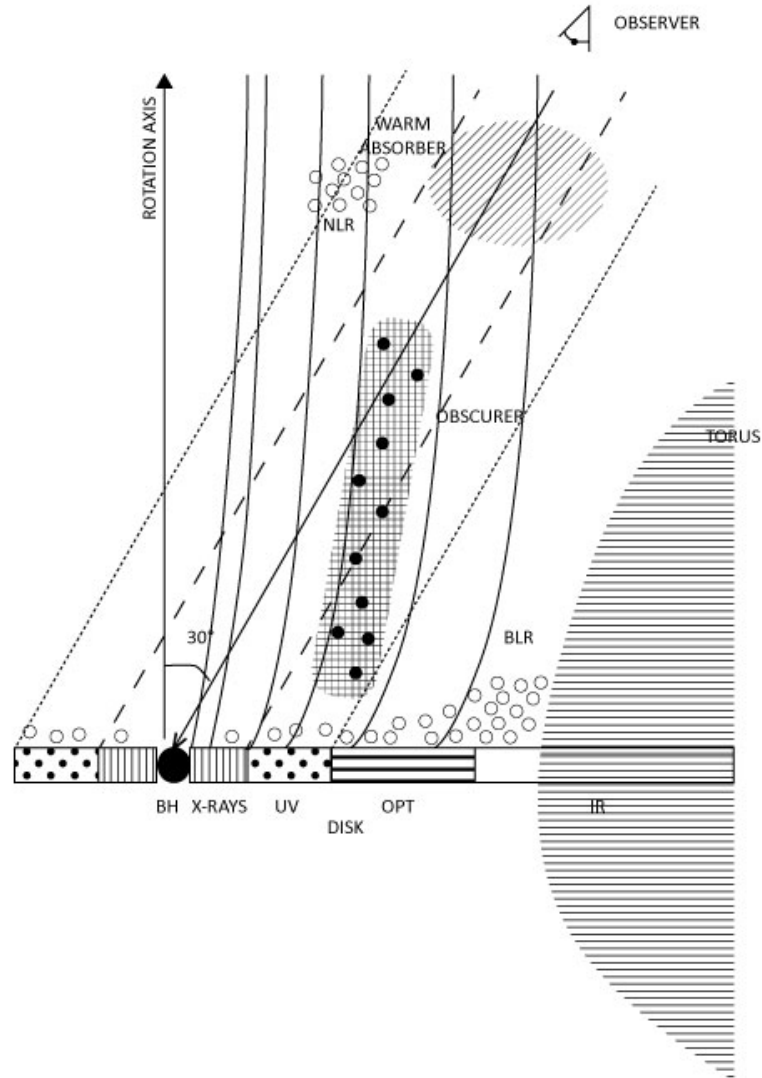
UV broad absorption lines

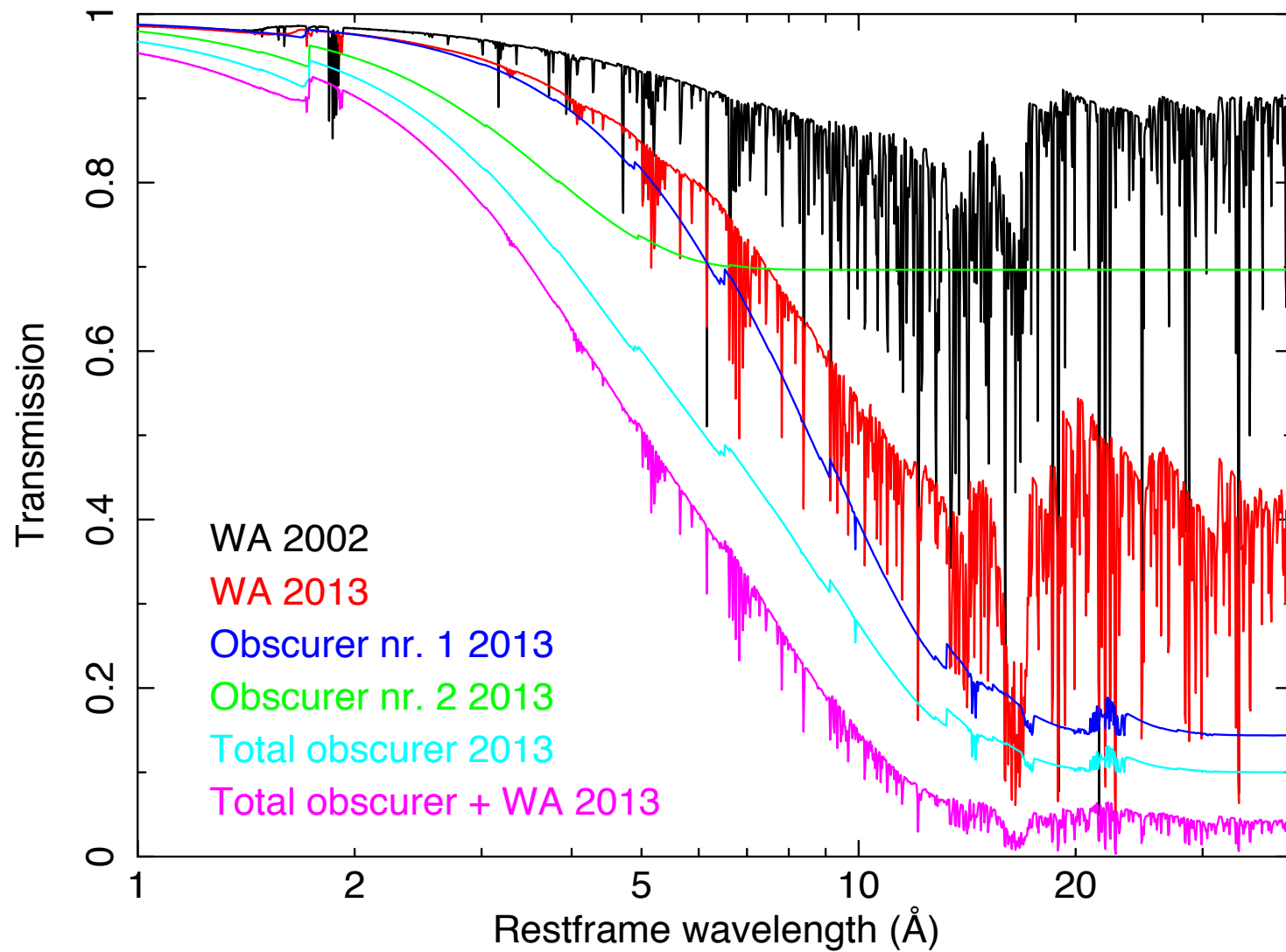


Obscuring stream

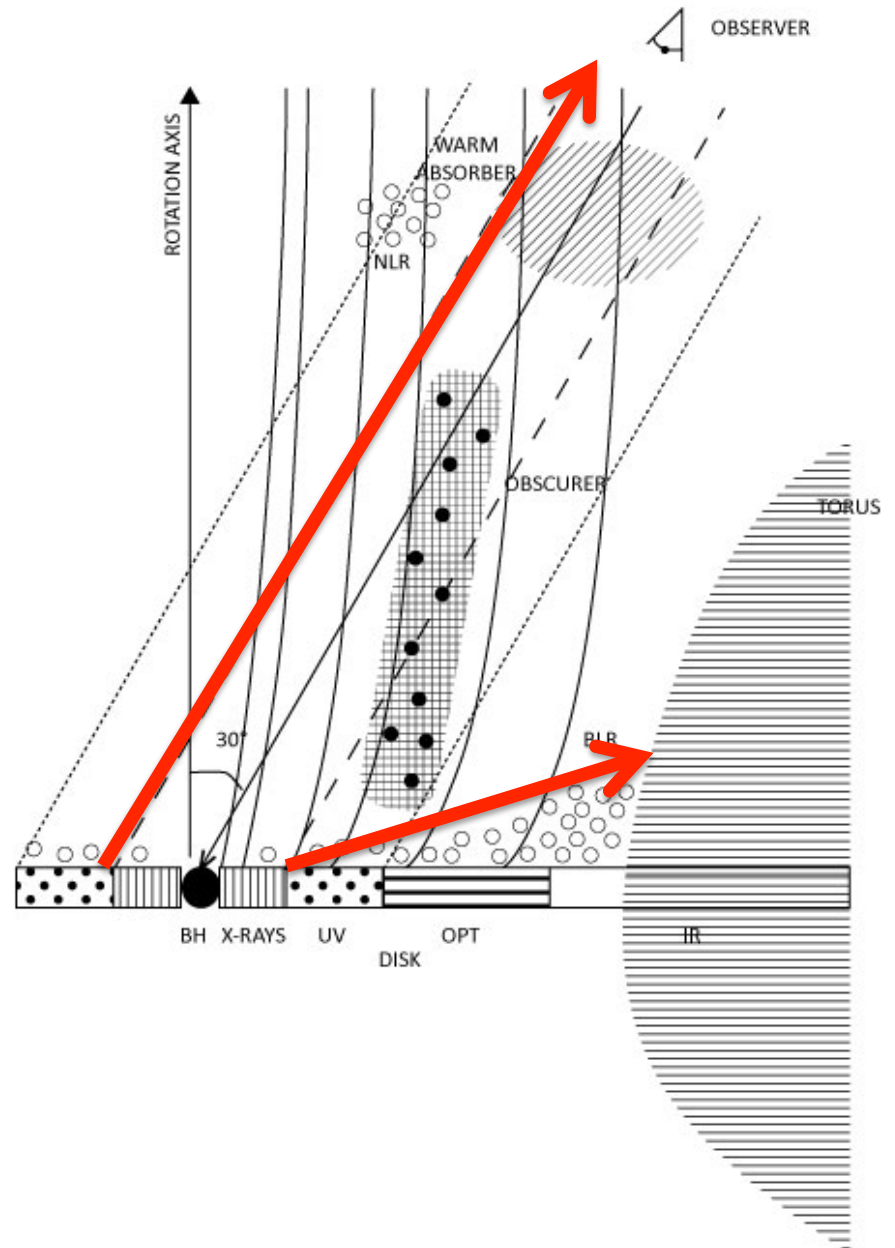
- *Two components:*
- **Main:** $\log \xi = -1.2$, $N_{\text{H}}=10^{26} \text{ m}^{-2}$, $f_{\text{cov}}=0.86$ (X-ray) and ~ 0.3 in UV; produces UV BAL
- **Second:** almost neutral, $N_{\text{H}}=10^{27} \text{ m}^{-2}$, $f_{\text{cov}}=0.3$ (X-ray) and <0.1 in UV
- Partial covering inner BLR, v up to 5000 km/s, inside WA \rightarrow distance few light days ($\sim 10^{14} \text{ m}$, 0.003 pc)
- Obscuration already 3 years ongoing

What is going on?



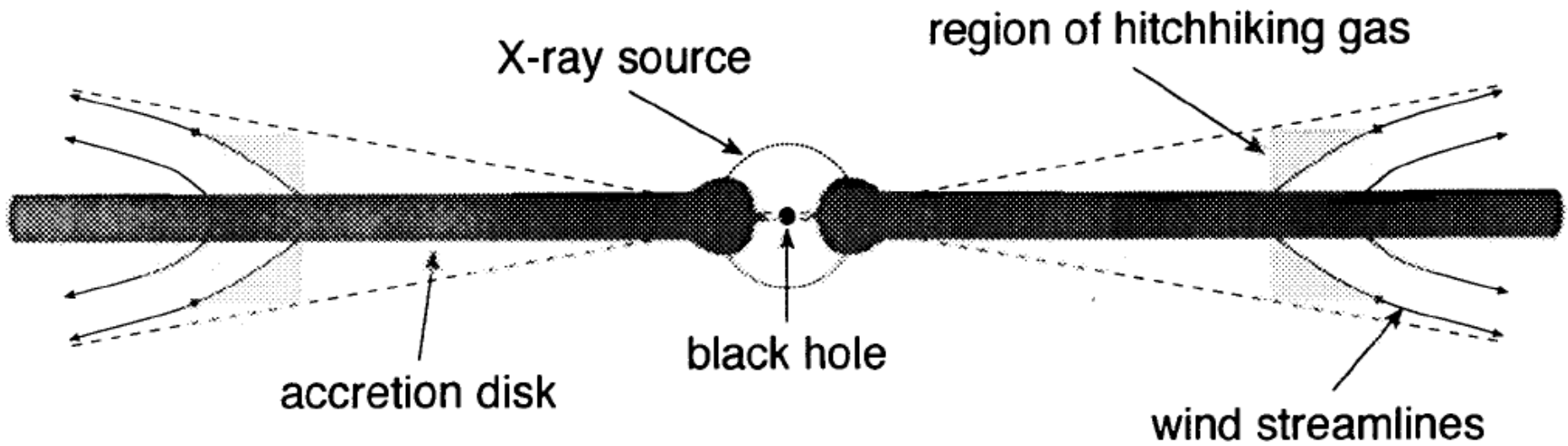


Shielding



Importance for feedback

(Murray et al. 1995)



Conclusion

- New obscuring stream appears in NGC 5548
 - Fast
 - Clumpy
 - Long-lasting
 - Close to BLR
 - Likely from accretion disk
- Importance: X-ray shielding process for feedback
- See also next 5 talks & posters F10, F36
- Movie
- Press release & paper tomorrow end of the day