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 → 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 ½ 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:** \( \log \xi = -1.2, \ N_H = 10^{26} \text{ m}^{-2}, \ f_{\text{cov}} = 0.86 \) (X-ray) and \( \sim 0.3 \) in UV; produces UV BAL

  • **Second:** almost neutral, \( \ N_H = 10^{27} \text{ m}^{-2}, \ f_{\text{cov}} = 0.3 \) (X-ray) and \(< 0.1 \) in UV

• Partial covering inner BLR, \( v \) up to 5000 km/s, inside WA \( \rightarrow \) distance few light days (\( \sim 10^{14} \text{ m}, \ 0.003 \text{ pc} \))

• 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