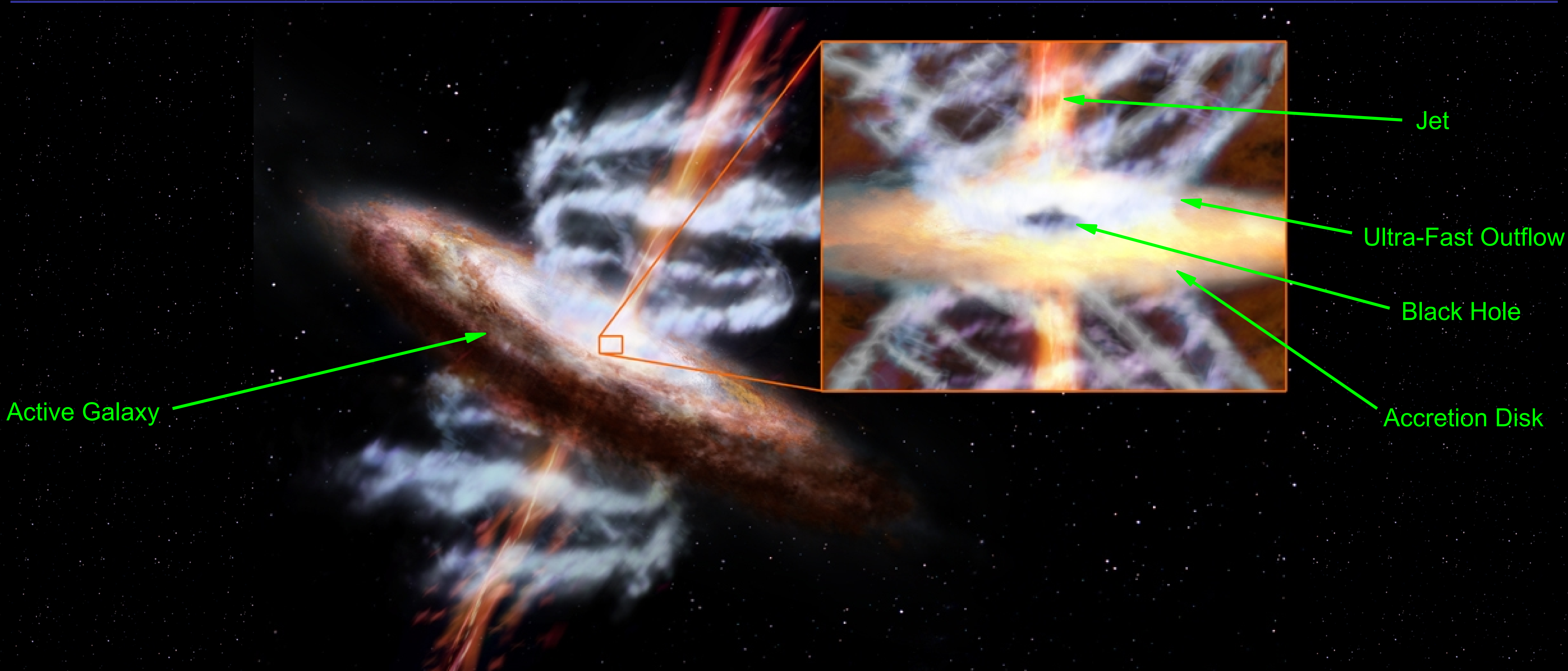


X-ray evidence for accretion disk outflows in local AGNs

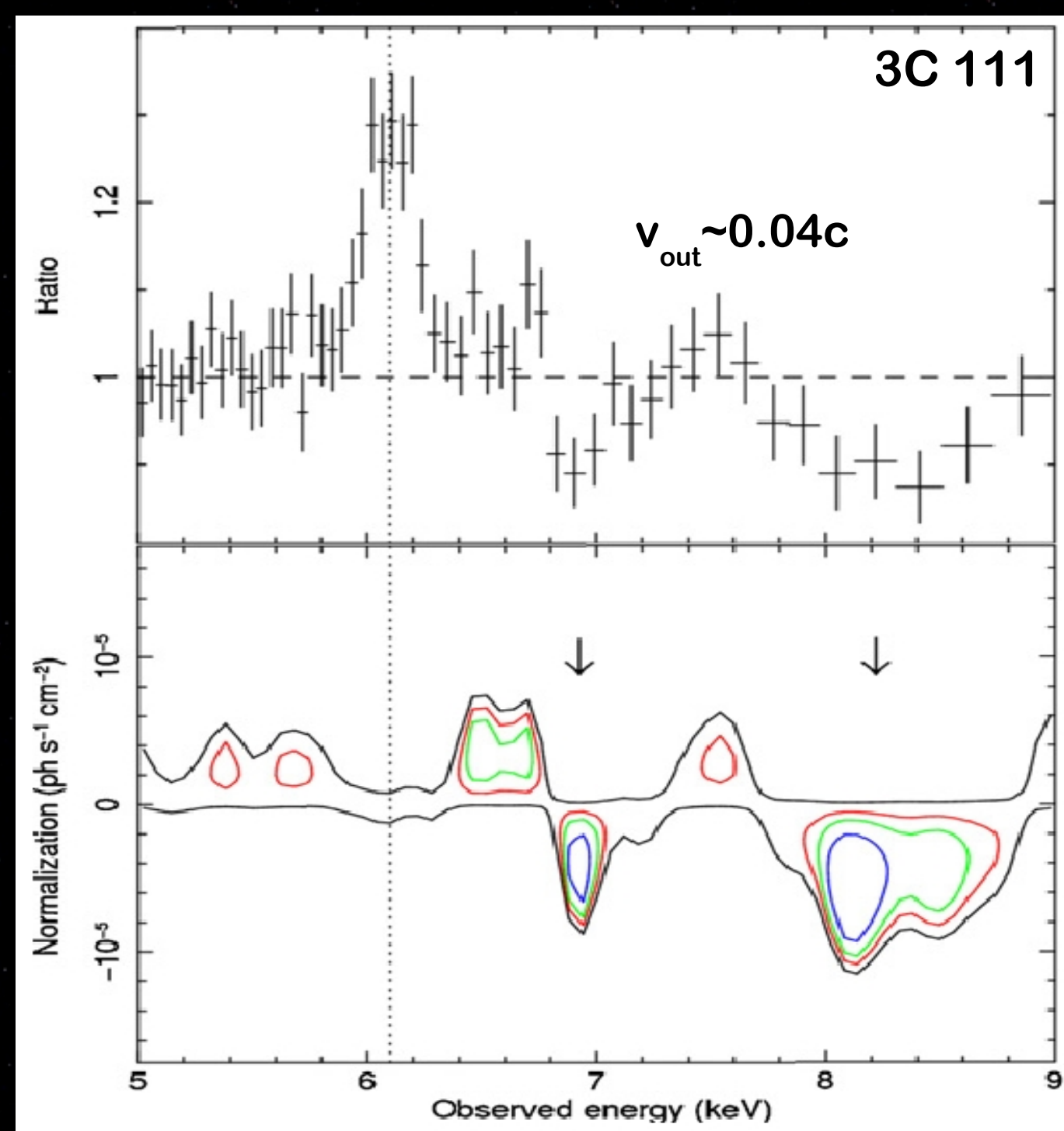
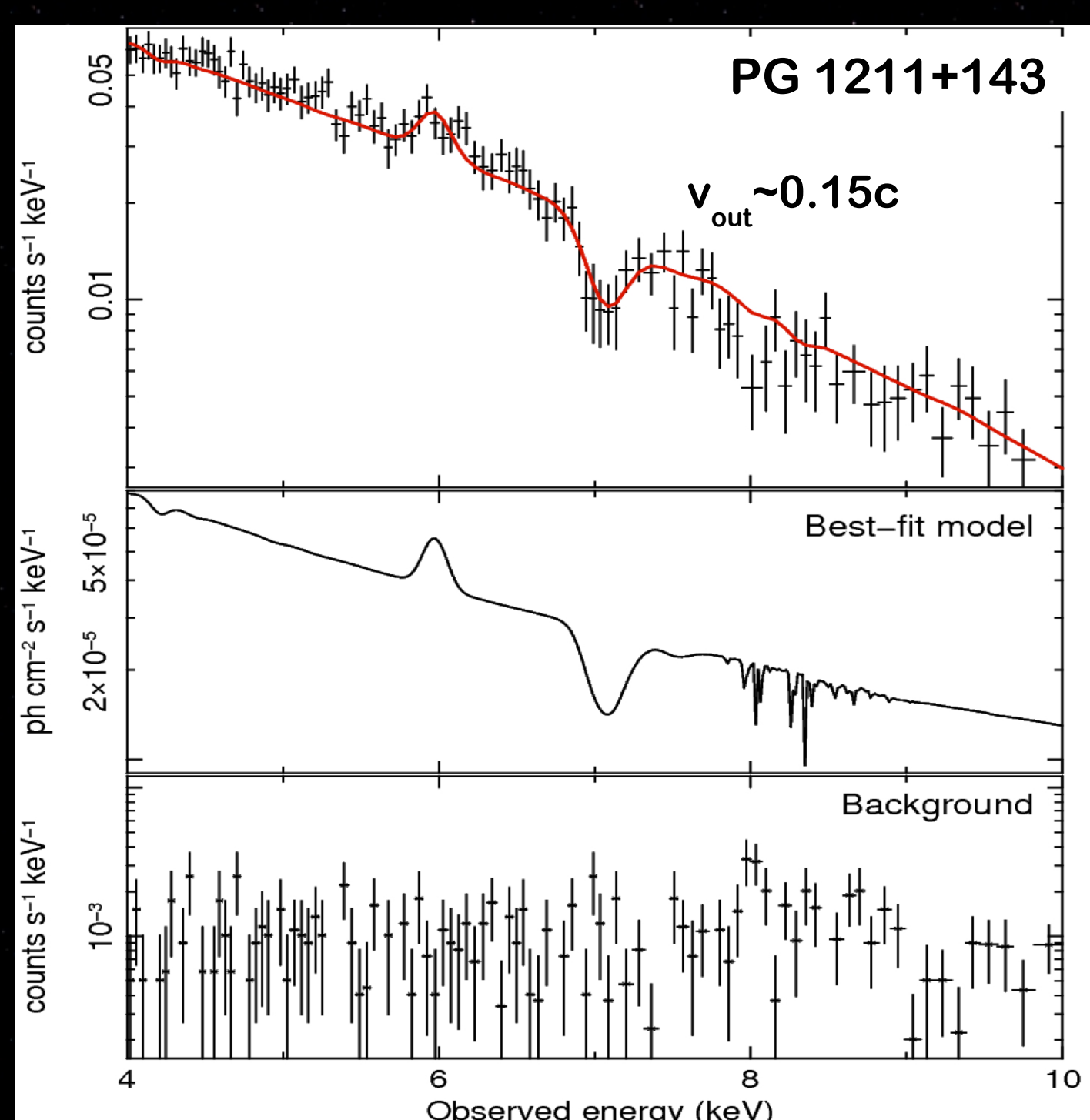
F. Tombesi (1,2), R. Sambruna (3), C. Reynolds (2), M. Cappi (4), J. Reeves (5), V. Braito (6)

(1) NASA/GSFC/CRESST (2) UMCP (3) George Mason University (4) INAF-IASFbo (5) Keele University (6) Leicester University

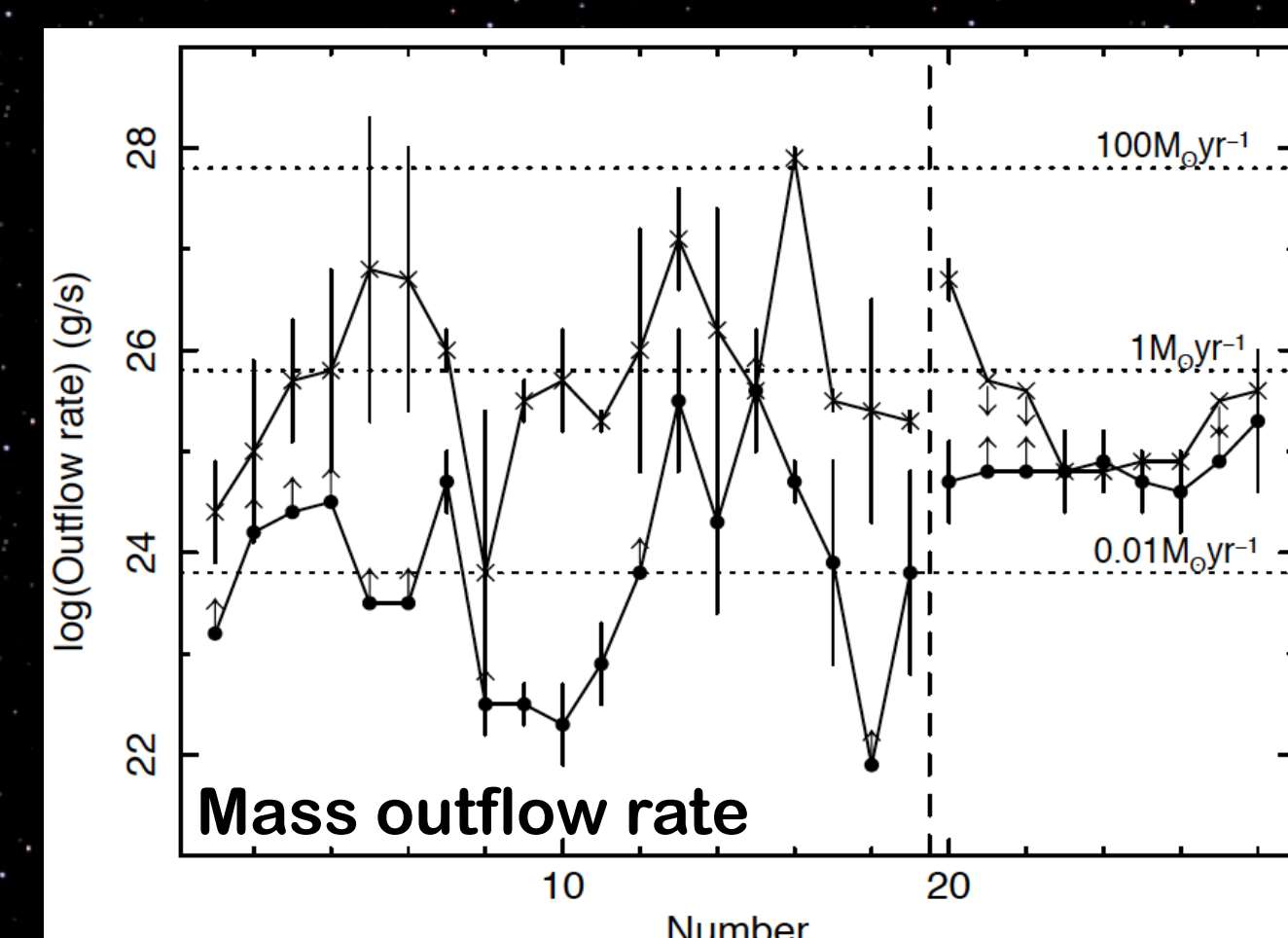
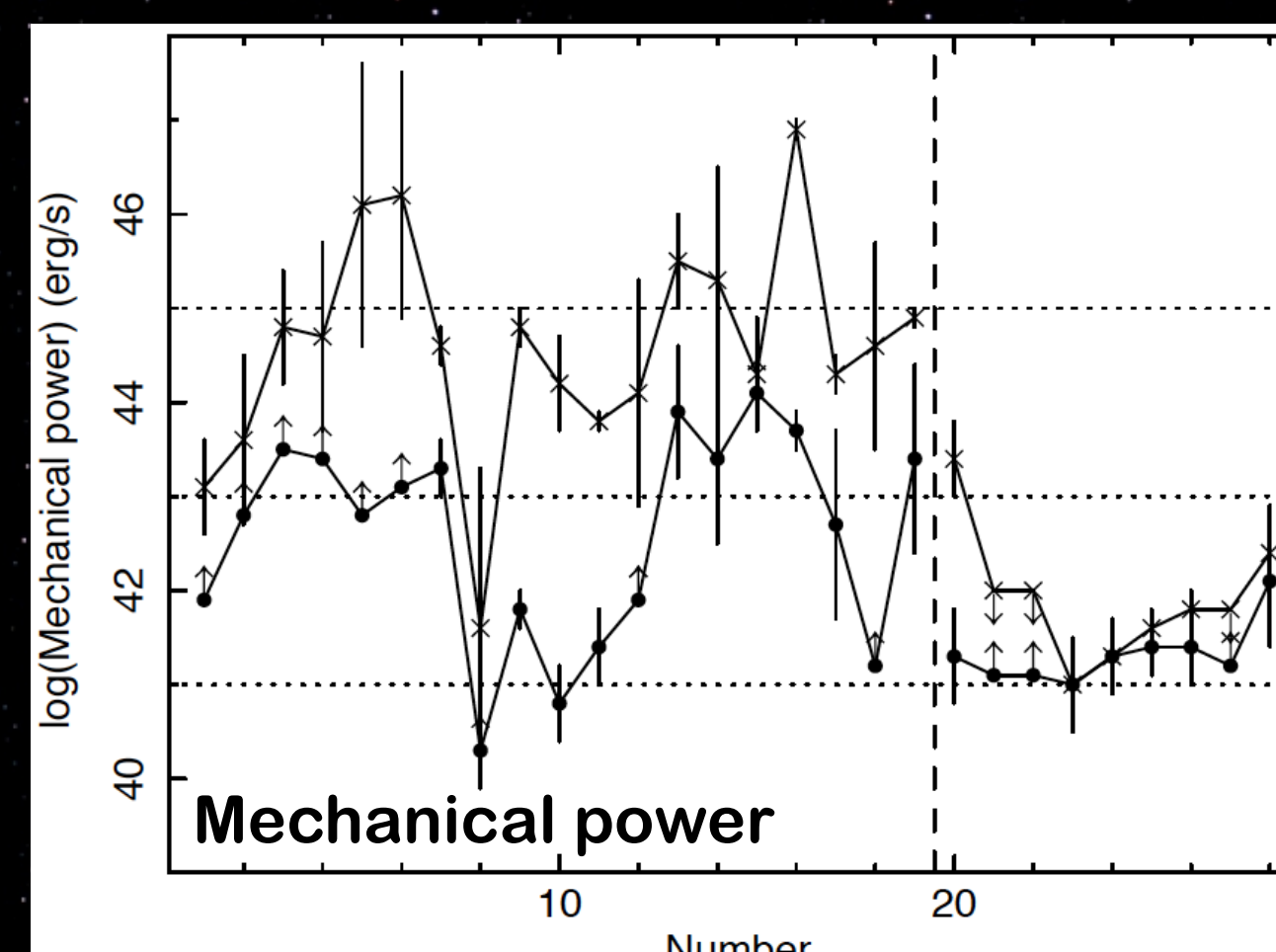
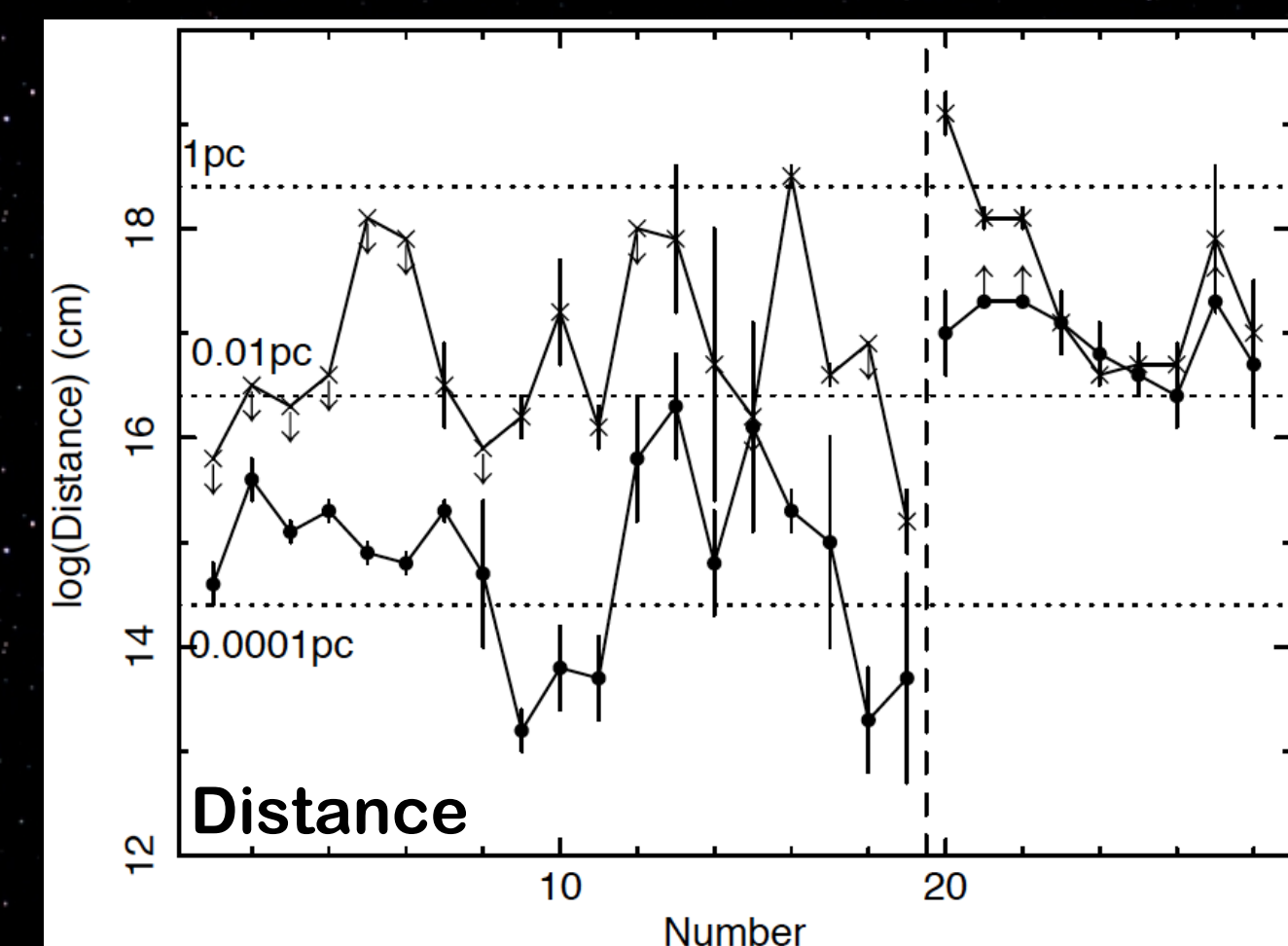
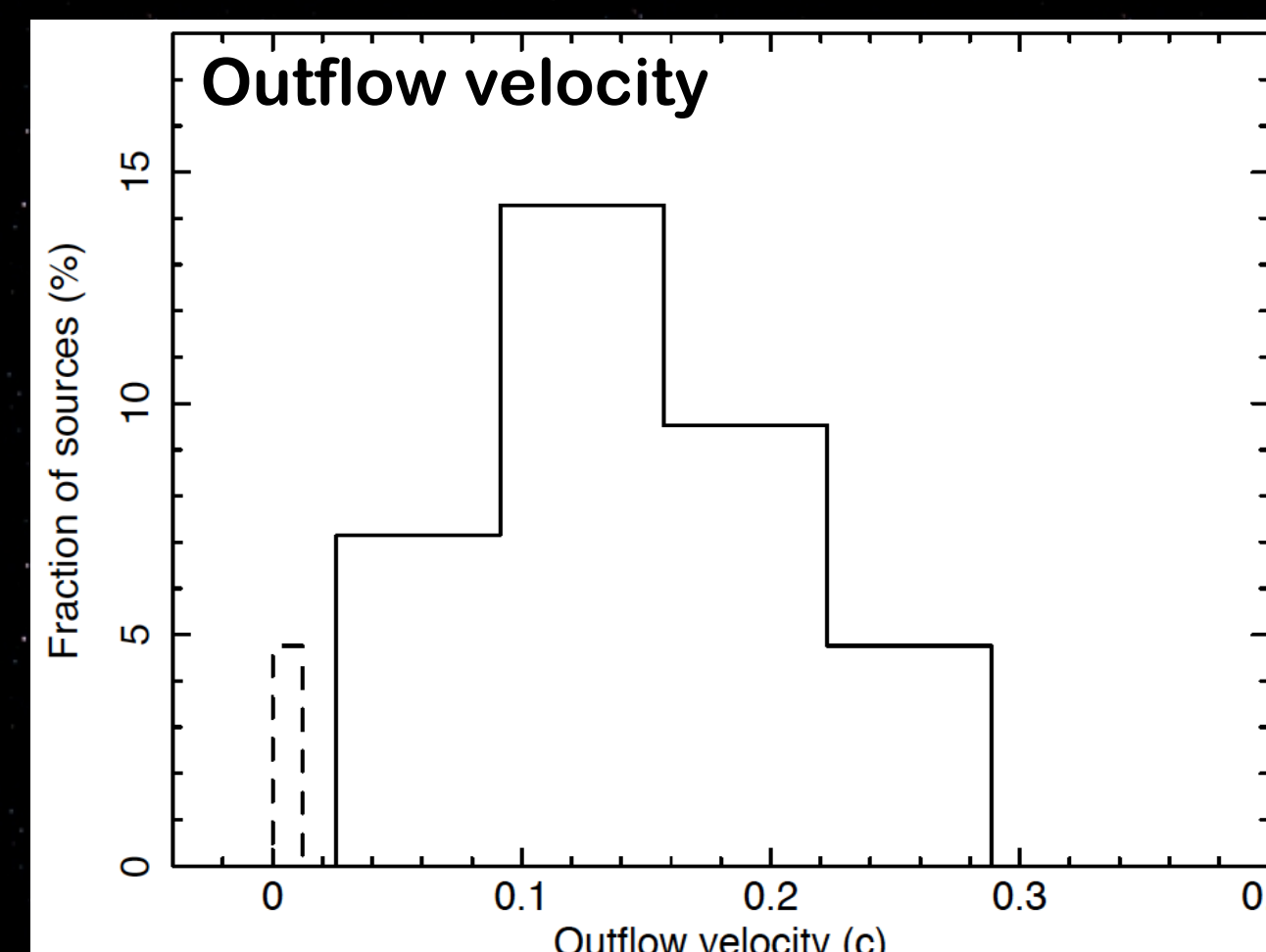
X-ray evidence for massive, highly ionized, ultra-fast outflows (UFOs) has been recently reported in a number of AGNs through the detection of blue-shifted Fe XXV/XXVI absorption lines. We present the results of a comprehensive spectral analysis of a large sample of 42 local Seyferts and 5 radio galaxies observed with XMM-Newton and Suzaku. We find that UFOs are common phenomena, being present in >40% of the sources. Their outflow velocity distribution is in the range ~ 0.03 - $0.3c$, with mean value of $\sim 0.14c$. The ionization parameter is very high, in the range $\log \xi \sim 3$ - $6 \text{ erg s}^{-1} \text{ cm}$, and the associated column densities are also large, in the range $\sim 10^{22}$ - 10^{24} cm^{-2} . Their location is constrained at $\sim 0.0003 - 0.03 \text{ pc}$ ($\sim 10^2 - 10^4 r_g$) from the central black hole, consistent with what is expected for accretion disk winds/outflows. The mass outflow rates are in the interval ~ 0.01 - $1 M_{\text{sun}} \text{ yr}^{-1}$ and the associated mechanical power is high, in the range $\sim 10^{42}$ - $10^{45} \text{ erg s}^{-1}$. Therefore, UFOs are capable to provide a significant contribution to the AGN cosmological feedback and their study can provide important clues on the connection between accretion disks, winds and jets.



X-ray spectral analysis of the AGN sample



Parameters of the UFOs



- Velocity distribution $\sim 10,000$ - $100,000 \text{ km/s}$ (~ 0.03 - $0.3c$)
- Distance ~ 0.0003 - 0.03 pc ($\sim 10^2$ - $10^4 r_g$) from black hole, consistent accretion disk outflows
- Mass outflow rate ~ 0.01 - $1 M_{\text{sun}} \text{ yr}^{-1}$, >5 - 10% accretion rate
- Mechanical power $\sim 10^{42}$ - 10^{45} erg/s $>> 0.3\% L_{\text{bol}}$, enough for feedback on host galaxy
- Power \sim radio jet, but UFO slower, more common, broad, massive, concurrent feedback

- Sample of 42 Seyferts and 5 BLRGs ($z \leq 0.1$) observed with XMM-Newton and Suzaku
- Systematic spectral analysis and search for blue-shifted Fe XXV/XXVI absorption lines
- Lines with blue-shift $>10,000 \text{ km/s}$ detected in $>40\%$ of sources, global significance $>5\sigma$
- Line widths of $\sim 1,000$ - $5,000 \text{ km/s}$, dominated by turbulent velocity broadening
- Spectral variability on short time-scales, even less than days, intermittent outflows
- Not collimated, large covering fraction (~ 0.4 - 0.6) and turbulent/clumpy absorbers
- Velocity, ionization ($\log \xi \sim 3$ - $6 \text{ erg s}^{-1} \text{ cm}$) and column density ($\sim 10^{22}$ - 10^{24} cm^{-2}) estimated from curve of growth analysis and detailed photo-ionization modeling

Main references in this poster: Tombesi et al. (2010a, A&A, 521, A57), Tombesi et al. (2010b, ApJ, 719, 700), Tombesi et al. (2011a, ApJ, 742, 44), Tombesi et al. (2011b, MNRAS, 418, L89), Tombesi et al. (2012, arXiv:1201.1897, MNRAS in press)

Press releases on Monday, February 27th: ESA - <http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=50097>

NASA - <http://www.nasa.gov/topics/universe/features/fast-outflow.html>

INAF - <http://www.media.inaf.it/2012/02/27/ufo-buchi-neri-xmm/>