Compton Thick AGN in XMM-COSMOS

G. Lanzuisi
P. Ranalli, I. Georgantopoulos, A. Georgakakis, I. Delvecchio, T. Akylas, S. Berta, A. Comastri, M. Brusa + COSMOS team...
Why bother?

...see also D. Alexander's talk...

- CT needed to reproduce the XRB

- Mostly from low luminous CT AGN @ z~1

http://www.oabo.inaf.it/~gilli/xrb.html
Common (>50% of Seyfert-2) in the local Universe
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Difficult to detect in 2-10 keV beyond few tens of Mpc
e.g. Ricci+16
Hard to identify

- Factor 50-100 fainter in 2-10 keV w.r.t. unobscured (→ undetected or low X-ray counts)

- Complex spectra

Murphy & Yaqoob (2009)
Hard to identify

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- Complex spectra

- With small differences between $N_H < \sim 10^{24}$ and $N_H > \sim 10^{24}$
Hard to identify

- Factor 50-100 fainter in 2-10 keV w.r.t. unobscured (→ undetected or low X-ray counts)

- Complex spectra

- With small differences between \( N_H < \sim 10^{24} \) and \( N_H > \sim 10^{24} \)

- plus scattered/thermal emission in the soft band
Hard to identify

- Factor 50-100 fainter in 2-10 keV w.r.t. unobscured (→ undetected or low X-ray counts)

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G. Lanzuisi

XMM-Newton: The Next Decade

ESA 2016 May 9-11
How many CT in XMM-COSMOS?

~1200 AGN with >30 counts
Rich multi-\(\lambda\) coverage
Deeper Chandra data to test the selection

10 CT candidates
29 highly obscured but C-thin
Lanzuisi et al. 2015 A&A 573, A137
Pure X-ray selection

- Deeper Chandra data from CCOSMOS-Legacy Civano+16

- More refined models Mytorus, BNTorus....

→ 80% detection efficiency
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Host properties

35-45% of merging/disturbed systems
(w.r.t ~15-20% for X-ray selected AGN)
see also Kocevski+15, Del Moro+16
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Comparison with XRB models

Number counts consistent with **XRB models** (e.g. Akylas+12).

http://indra.astro.noa.gr/xrb.html

But:

- highly uncertain CT fraction especially at $N_h > 10^{25}$ cm$^{-2}$
  e.g. Comastri+15

- highly uncertain refl. Fraction

![Graph showing comparison with XRB models](image)
Conclusions

1\textsuperscript{st} step: Detection
Chandra is more efficient at faint fluxes
e.g. Cosmos-Legacy (4.6Ms) has 60-70 CT candidates
vs. 10 in XMM-Cosmos (1.5Ms)

2\textsuperscript{nd} step: Characterization
Deep XMM obs. allow to put real constrain
on $N_H$ and refl. fraction
As it is possible at $z=0$ with $>10$keV data
e.g. Ricci+16, Koss+16, Akylas+16

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{chart.png}
\caption{1500 net cnts 1.9 Ms}
\end{figure}
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Comastri+11
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Covering the full COSMOS (or SXDS, or AEGIS) with 0.5 Ms average,
effective expo would take $\sim$5 Ms/deg$^2$ and the number of CT at high z
would still be small...

Targeting 10-20 good (X-Luminous) candidates (from XXL, Stripe82 etc.)
with deep exposures would build the CT reference sample at high-z!