# ON THE COSMIC EVOLUTION OF AGN OBSCURATION IN THE STRIPE 82X

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**ABSTRACT**: This study analyzes XMM and Chandra observations in the 31.3 deg2 Stripe-82X field (S82X, LaMassa+16), focusing on 2937 candidate AGN with solid redshifts and sufficient counts. We derived the intrinsic, model-independent, fraction of obscured AGN (22<log NH/cm-2<24) up to z=4, finding an increase with redshift and a decline with luminosity. This work constrains the AGN obscuration and spectral shape of the still uncertain high-luminosity and high-redshift regimes (log Lx/erg/s>45.5, z>3), where the obscured AGN fraction is 64±12%. The total, obscured, and unobscured XLFs are determined up to z=4, with obscured AGN dominating at z>2 at all luminosities. Intriguingly, the derived black hole accretion density (BHAD) evolution shows that Compton-thick (log NH/cm-2>24) AGN contribute to the accretion history of AGN as much as all other AGN populations combined, significantly exceeding previous estimates (e.g., Ueda+14, Aird+15).

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# 4. AGN DENSITY & X-RAY LUMINOSITY FUNCTION EVOLUTION



The total, unobscured, and obscured X-ray luminosity functions (XLFs) are derived up to z=4:

- The obscured AGN contribution increases with redshift
- At z>2 obscured AGN dominate at all luminosities
- The density peaks evolve with redshift (downsizing)
- Obscured and unobscured AGN seem to peak at different redshifts

Our XLF can be extrapolated out to higher z and Lx. Grab it on *github.com/alessandropeca* 



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#### **5. BLACK HOLE ACCRETION DENSITY EVOLUTION**

The black hole accretion density (BHAD) is computed without Compton-thick (CK, log NH/cm-2>24) AGN, since they are too few in our data to compute intrinsic distributions. However:

- Our BHAD is consistent with others (e.g., Ueda+14, Aird+15) which include CK AGN populations based on small observed samples, but it is consistent with Ananna+19's model only when excluding CK AGN
- All the BHADs are significantly lower than the complete Ananna+19 one (note that this model is the only one that fits all published X-ray survey data): have heavily CK populations been underestimated before?



## 6. THE FUTURE: STRIPE 82 XL (S82XL)

Including new archival observations (Chandra and XMM) we will:

- double the current number of AGN (~12k X-ray sources)
- improve the current depth by a factor of ~2
- cover a total of ~50-55 deg2 area of hard X-rays (>2keV)

