The intrinsic fraction of type 2 AGN

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Most AGN studies find that the obscured AGN fraction decreases as the luminosity increases. This is usually explained by invoking receding torus models. However, recent results for the intrinsic type 2 fraction based on a complete hard X-ray selected sample (**BUXS: Bright Ultrahard XMM-Newton Survey**) showed little to no luminosity dependence, and uncovered a population of hidden luminous Compton-thick AGN (**Mateos+17**).

We furthered this analysis by applying a fully Bayesian approach to derive the distribution of column densities (N_H) for the 252 AGN with spectroscopic redshifts within BUXS. For a well-defined sub-sample of type 1 AGN at z=0.05−1, we compared these results to the ones obtained for the optical obscuration. We fitted the optical spectra to classify the sources in types (1.0-1.9), based on emission line ratios, and to measure the optical-UV continuum obscuration (A_V).

BUXS: Bright Ultrahard XMM-Newton Survey

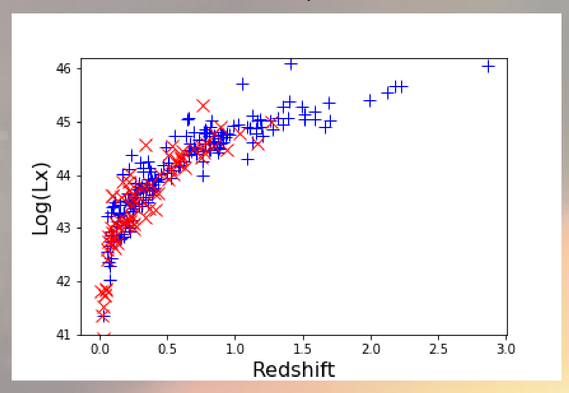
Flux limited sample (**Mateos+12**):

$F_{4.5\text{-}10\ keV} > 6x10^{-14}$ erg cm^{-2} s^{-1}

252 non-BL Lac AGN with spectroscopic redshifts (99% spectroscopic identification rate):

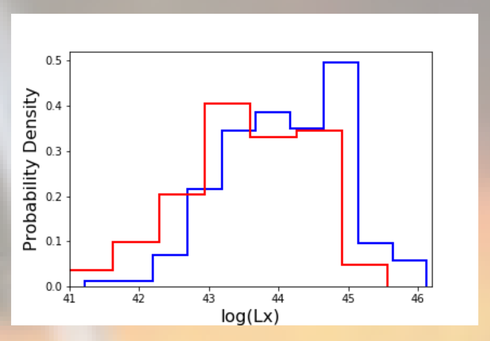
+ 172 optical **type 1 AGN**

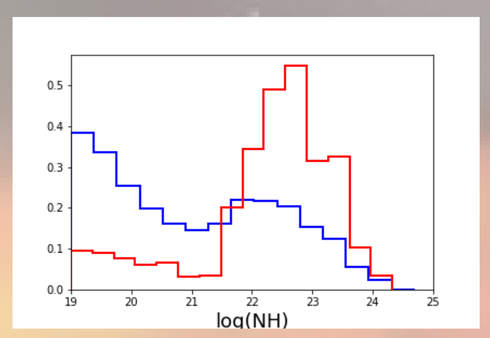
x 80 optical **type 2 AGN**

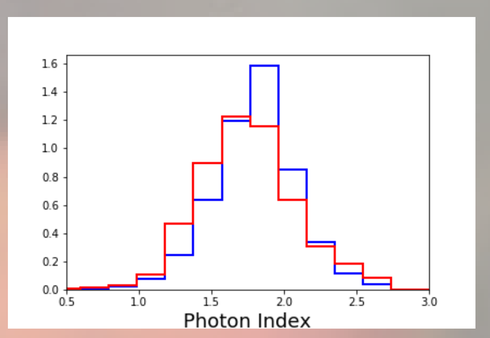


X-ray spectral fits

Bayes+MCMC to derive probability distributions for **type 1** and **type 2 AGN**:







Optical classification/X-ray obscuration “mismatches”: 10-20%

X-ray obscuration vs type 1 optical spectral types

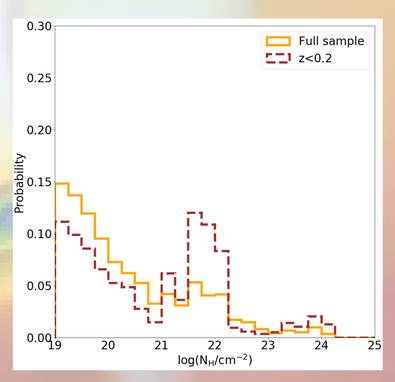
Type 1 sub-sample

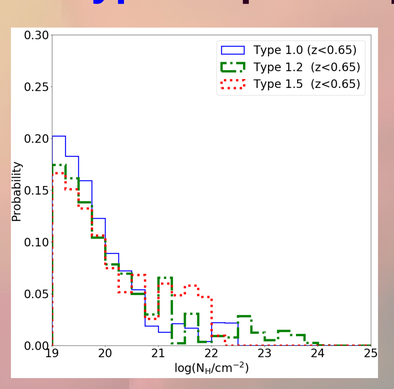
Intermediate type classification depends on redshift, luminosity and wavelength coverage:

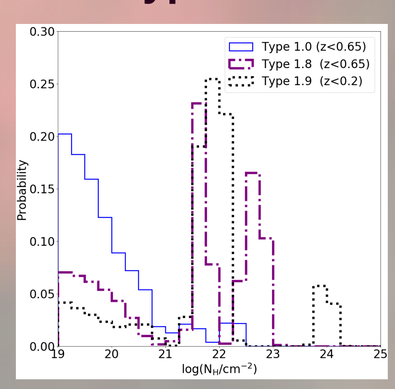
$\log(L_X/erg\ s^{-1})>42$ z=0.05-1 → **132 type 1 AGN**

Type 1.0	Type 1.2	Type 1.5	Type 1.8	Type 1.9	Type 1 (Mg)
35	36	20	7	13	21

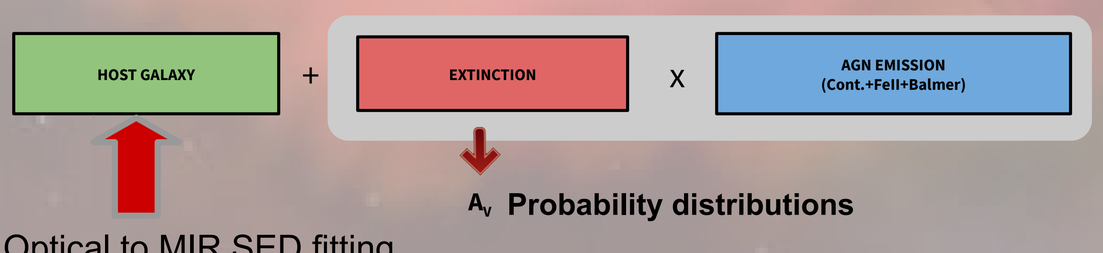
For type-1.0/2/5/8 classification complete in z<0.65, for type-1.9 in z<0.2



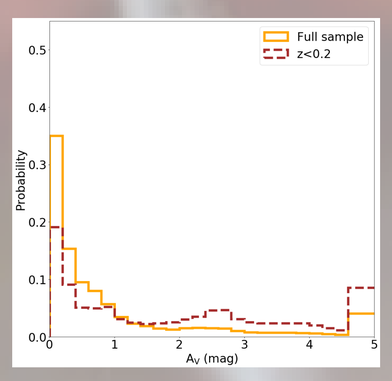


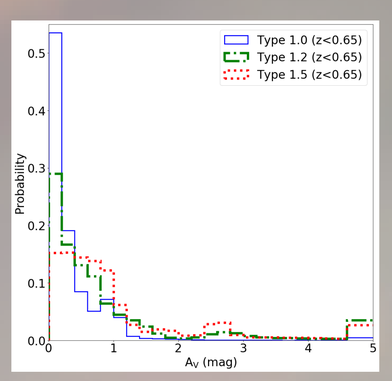


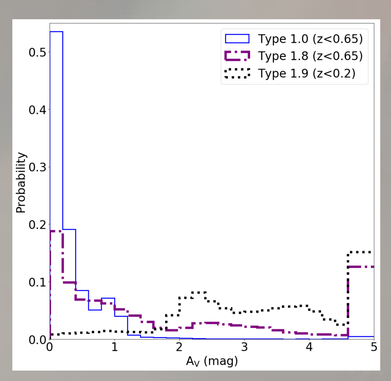
Extinction: Optical fits



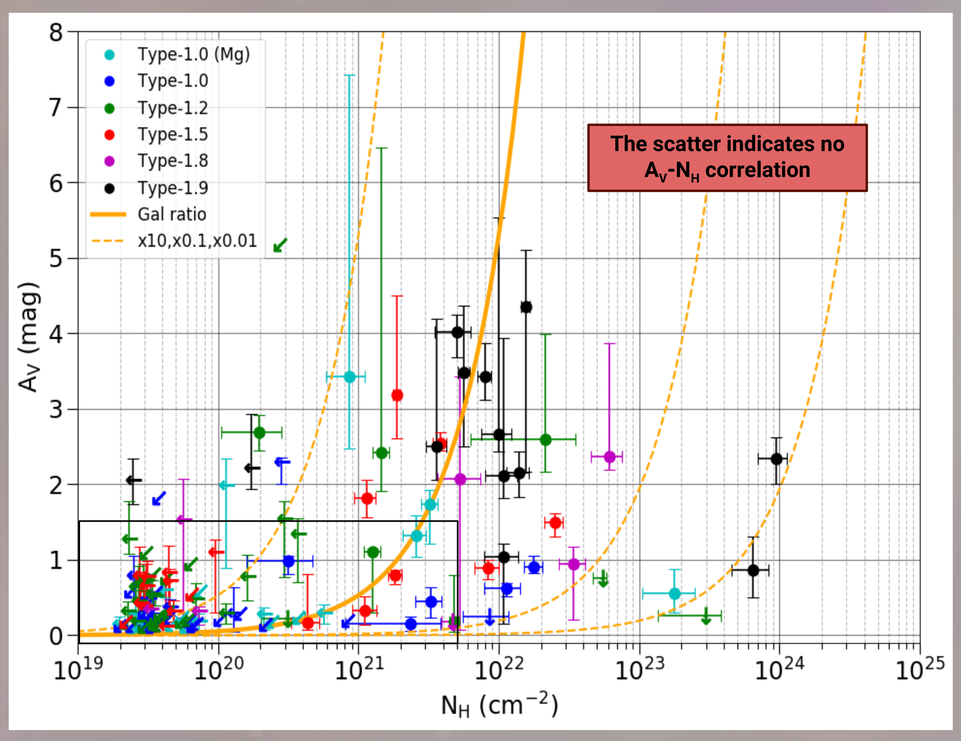
Optical extinction vs type 1 optical spectral types







Optical extinction vs X-ray obscuration

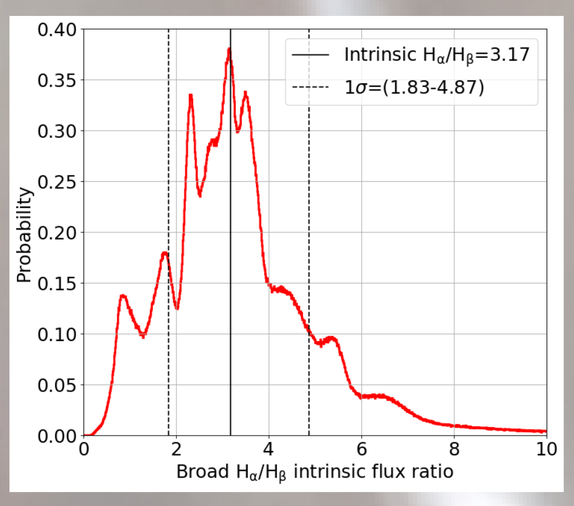


In those cases in which we can constrain both N_H and A_v, the values are **not** preferentially distributed above or below the Galactic gas-to-dust ratio.

Clear tendency towards increasing A_V and N_H from 1.0 to 1.9 objects

The 1.0-1.2-1.5 and 1.8-1.9 subsets are statistically different → different families, different sources/location of obscuration?

Balmer decrement



Substantial dispersion → this ratio should be taken with extreme caution, if not discarded as an obscuration measurement altogether.

Work in progress: To derive the intrinsic fraction of obscured AGN using the full N_H probability distribution.