INSTITUTE FOR ASTRONOMY, ASTROPHYSICS, SPACE APPLICATIONS & REMOTE SENSING

IAASARS
NATIONAL OBSERVATORY OF ATHENS

XMMFITCAT-Z: The enhanced XMM-Newton spectral-fit database by the inclusion of photometric redshifts

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The XMM-Newton spectral-fit database is an ESA (PRODEX) funded project aimed to derive added value products from the EPIC data contained within the XMM-Newton serendipitous source catalogue. The database is subdivided into two projects: XMMFITCAT, which contains spectral-fitting results for all the pipeline-extracted spectra within the 3XMM catalogue; and XMMFITCAT-Z, which will contain machine-learning derived photometric redhsifts and redshift-dependent spectral-fitting results for the sources within the 3XMM catalogue with optical (SDSS and/or Pan-STARRS) and/or IR (near-IR and WISE) counterparts. The main goal is to provide the astronomical community with a tool to query the catalogue according to spectral properties and thus, to construct large and representative samples of X-ray sources fulfilling the spectral criteria.

XMMFITCAT

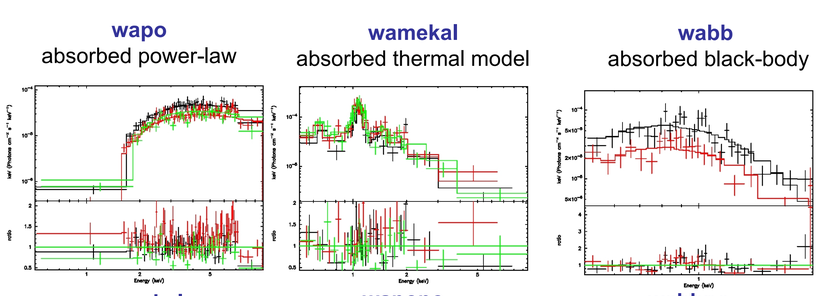
The latest release of XMMFITCAT (based on 3XMM-DR6) contains spectral-fitting results for ~ 150,000 detections corresponding to ~ 100,000 unique sources.

Spectral models within XMMFITCAT

wapo
absorbed power-law

wamekal
absorbed thermal model

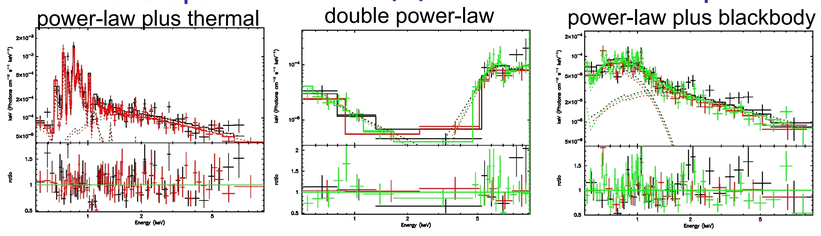
wabb
absorbed black-body



wamekalpo
power-law plus thermal

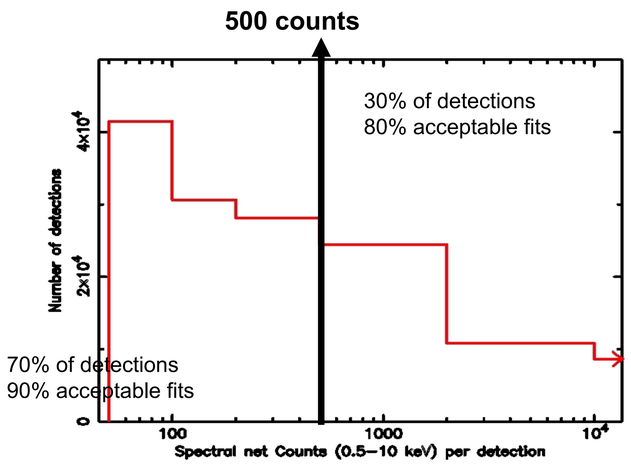
wapopo
double power-law

wabbpo
power-law plus blackbody



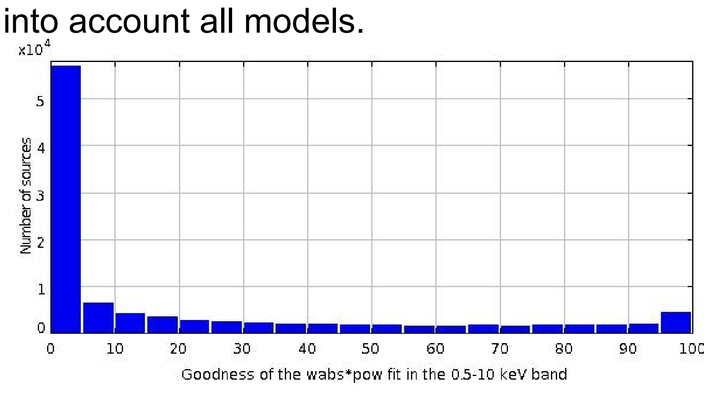
Spectra and spectral-fitting quality

Spectral-fitting results are available for **all detections with more than 50 net (background subtracted) counts in at least one instrument** (pn or MOS1 or MOS2). Models **wamekalpo, wapopo, and wabbpo** are only applied to sources with more than 500 net counts.



Goodness of fit

Estimated form `XSPEC goodness` command; but also reduced χ^2 provided.
80% of the detections with acceptable fits, taking into account all models.



XMMFITCAT-Z

Multi-catalogue cross-match

The source matching is achieved using the cross-correlation tool **xmatch**, which matches symmetrically an arbitrary number of catalogues providing a Bayesian probability of association or non-association (Pineau et al. 2017).

SDSS/UKIDSS/2MASS/WISE

SDSS counterparts for ~ 40,000 3XMM sources, 60% of them also with WISE counterparts, and more than 20% with also NIR counterparts.

Pan-STARRS/UKIDSS/2MASS/VISTA/WISE
(preliminary results)

Pan-STARRS counterparts for ~ 60,000 3XMM sources, 64% with WISE counterparts, 25% with NIR counterparts.

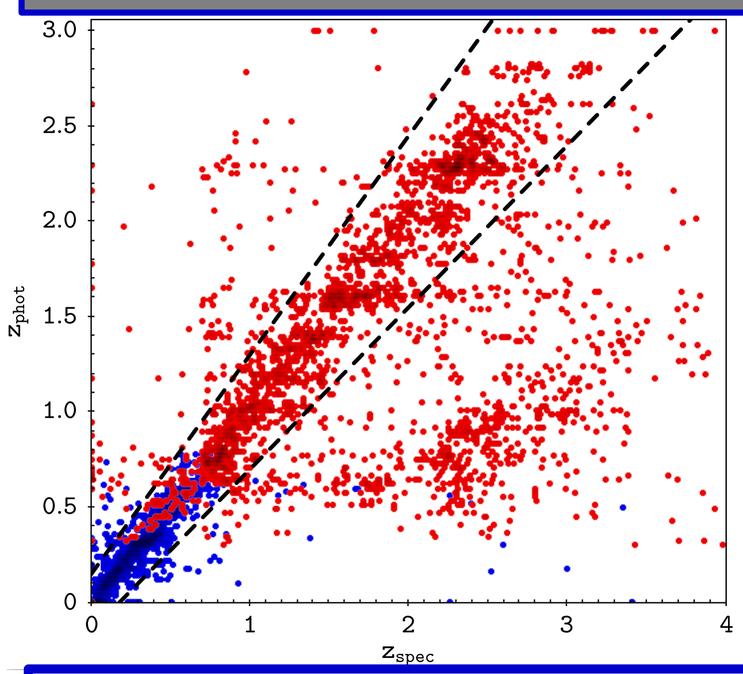
Photometric redshifts

The Machine Learning code used to derive photometric redhifts is MLZ-TPZ (Carrasco Kind & Brunner 2013).

Training samples specifically built to derive photo-zs for X-ray sources. X-ray surveys used: XBS, XMS, XWAS, COSMOS and XXL-North.

Different training samples were created depending on the number of photometric data available: 5 filters (30% of sources; SDSS-ugriz; Pan-STARRS-grizy); 7 filters (45%; optical+WISE-w1w2); 8 filters (5%; optical+NIR-HJK); and 10 filters (20%; optical+NIR+WISE).

Pleliminary results



Plot: derived photo-zs for point-like (red) and extended (blue) sources in the optical for sources with Pan-STARRS counterparts

SDSS/Pan-STARRS	Number of filters	MAD	Outliers(%)
Point-like	5	0.052/0.093	29/40
	7	0.043/0.059	19/25
	8	0.039/0.050	20/26
	10	0.033/0.042	14/16
Extended	5	0.048/0.042	18/13
	7	0.038/0.026	11/6
	8	0.037/0.035	14/9
	10	0.031/0.024	9/4

More info: http://xraygroup.astro.noa.gr/Webpage-prodec/
Corral et al 2015, A&A, 576,61

Science outcome: See poster P04