AllWISE Rosat-2RXS and XMMSlew2 associations done using NWAY--An accurate algorithm to pair sources simultaneously between N catalogs

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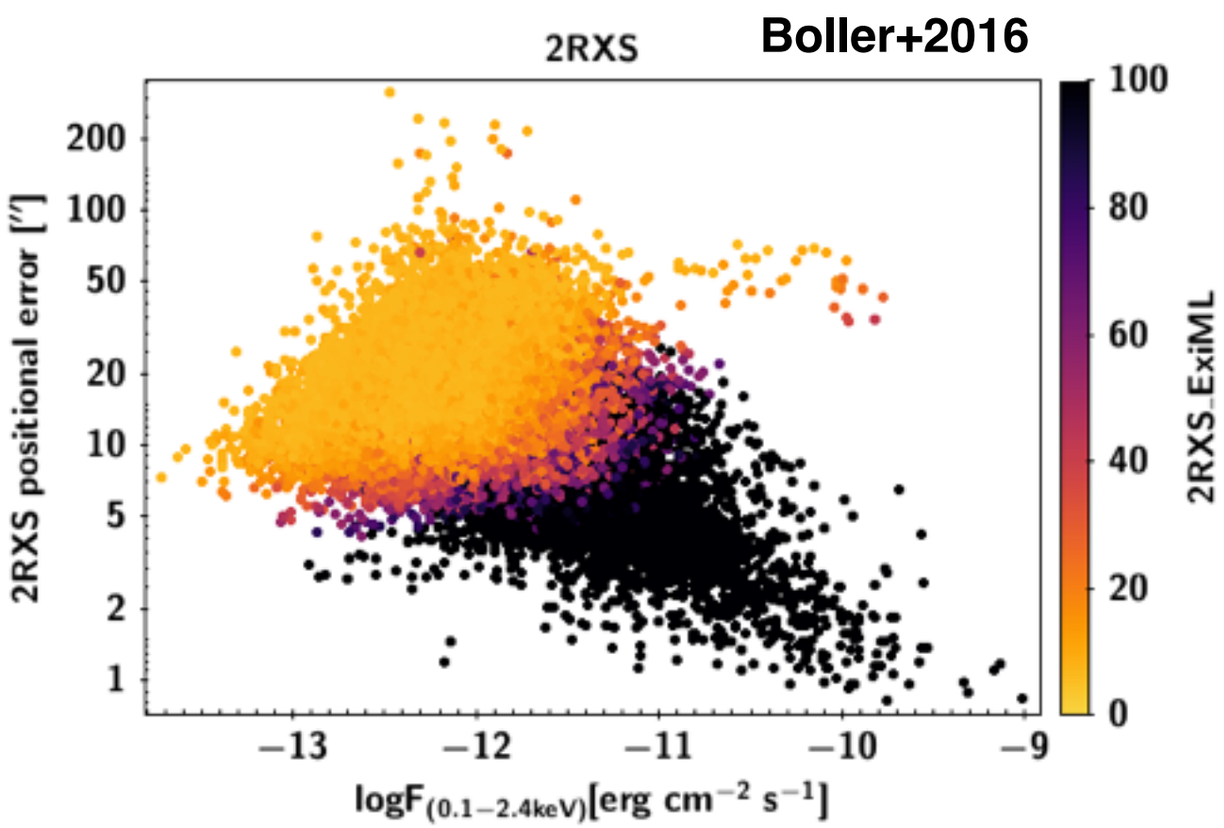
https://arxiv.org/abs/1705.10711

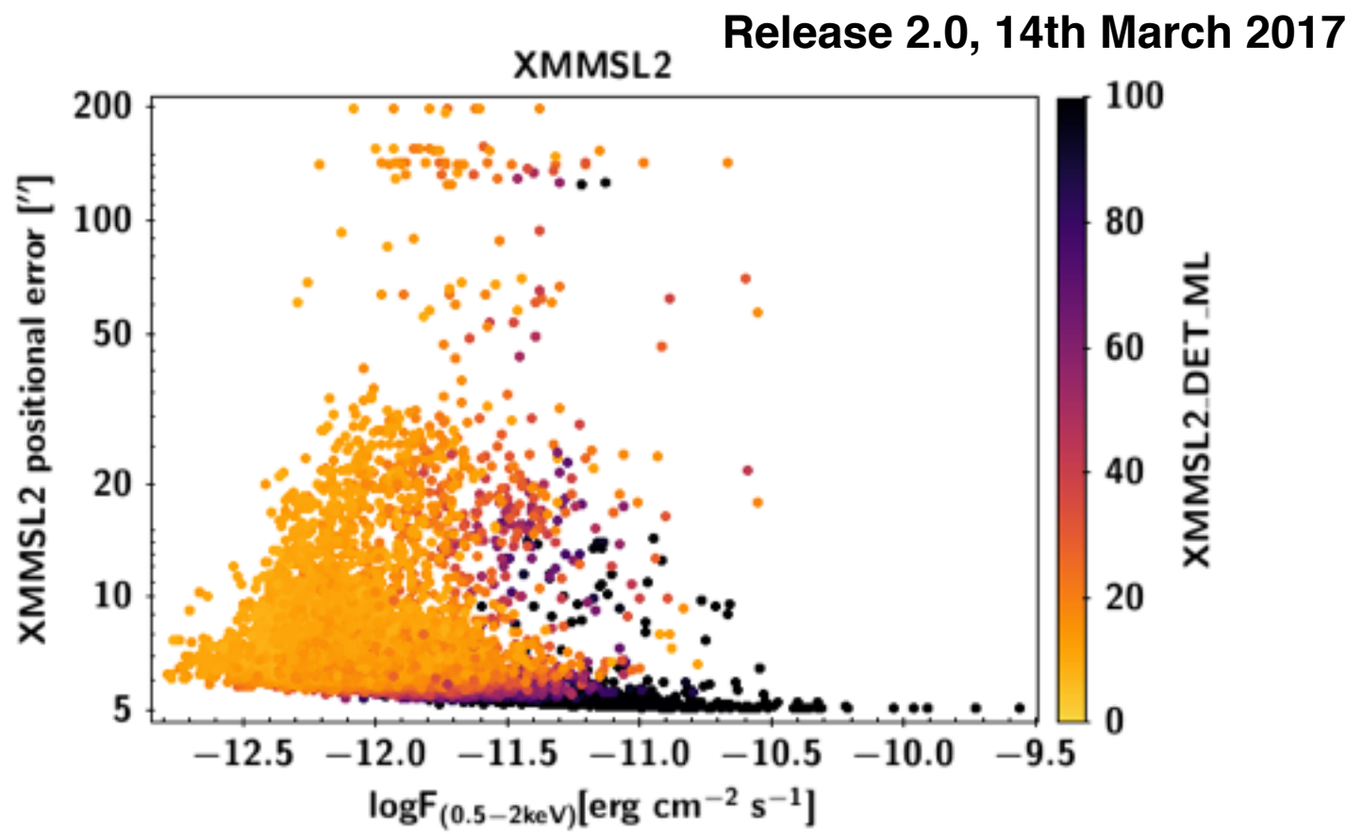
2RXS & XMMSL2



|b>15|
away from LMC/SMC

N=106573,
area=30575,9 sqdeg

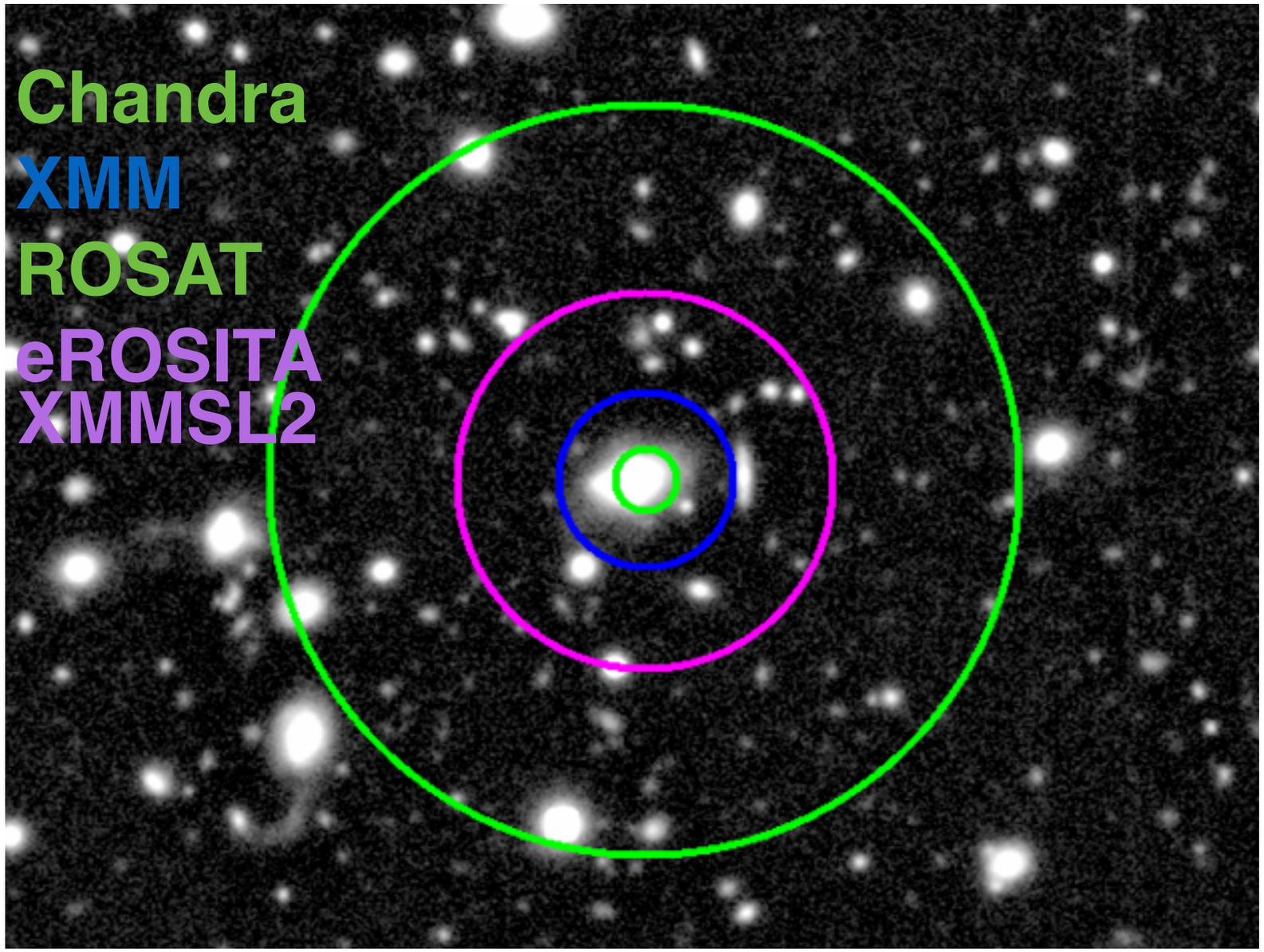
Release 2.0, 14th March 2017



N=17672,
area=25565 sqdeg

9333 sources
are in common
within 1’

Counterpart identification



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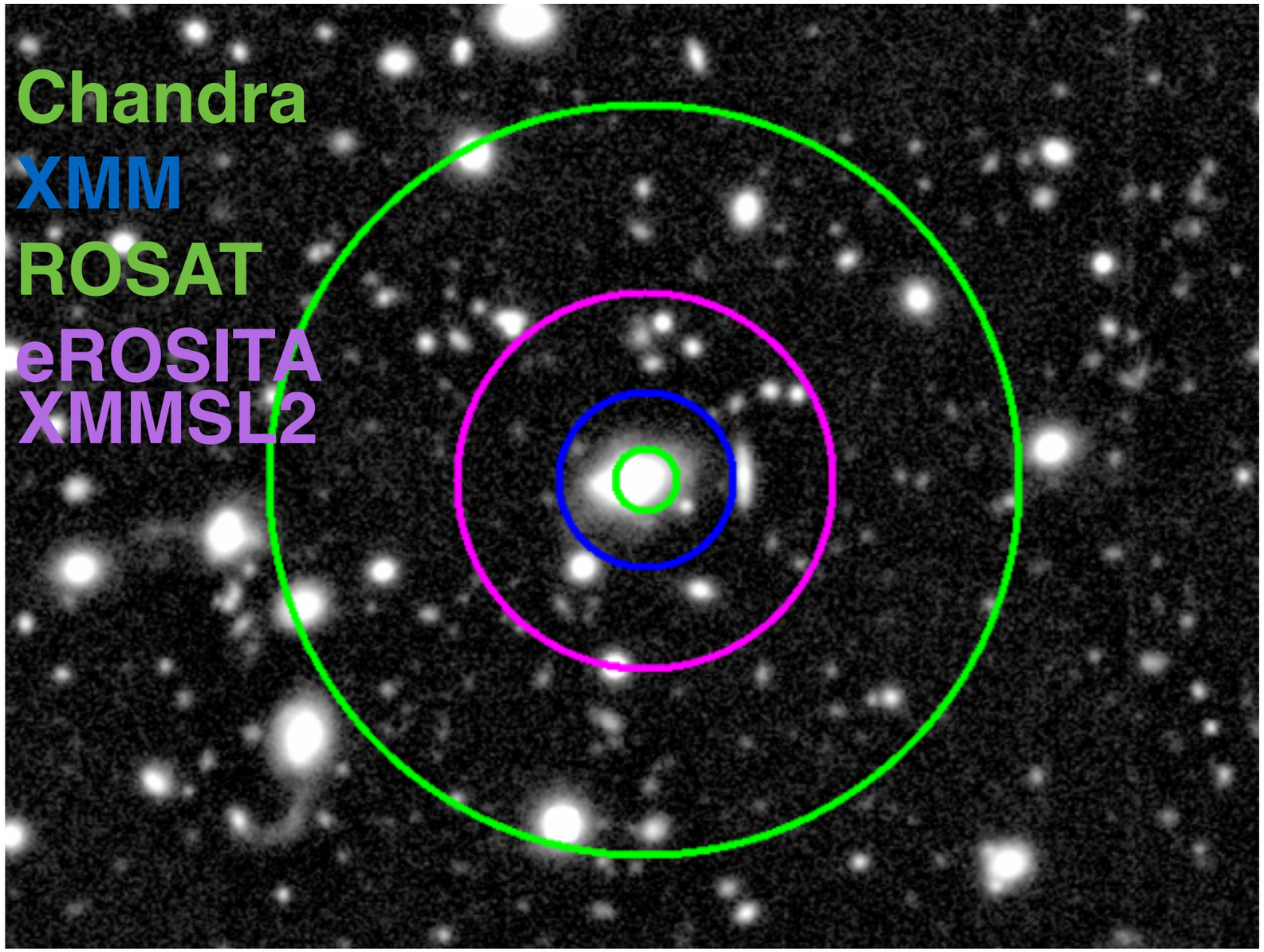

Because of variety of SEDs and large redshift range, one band only, even if deep, is not sufficient

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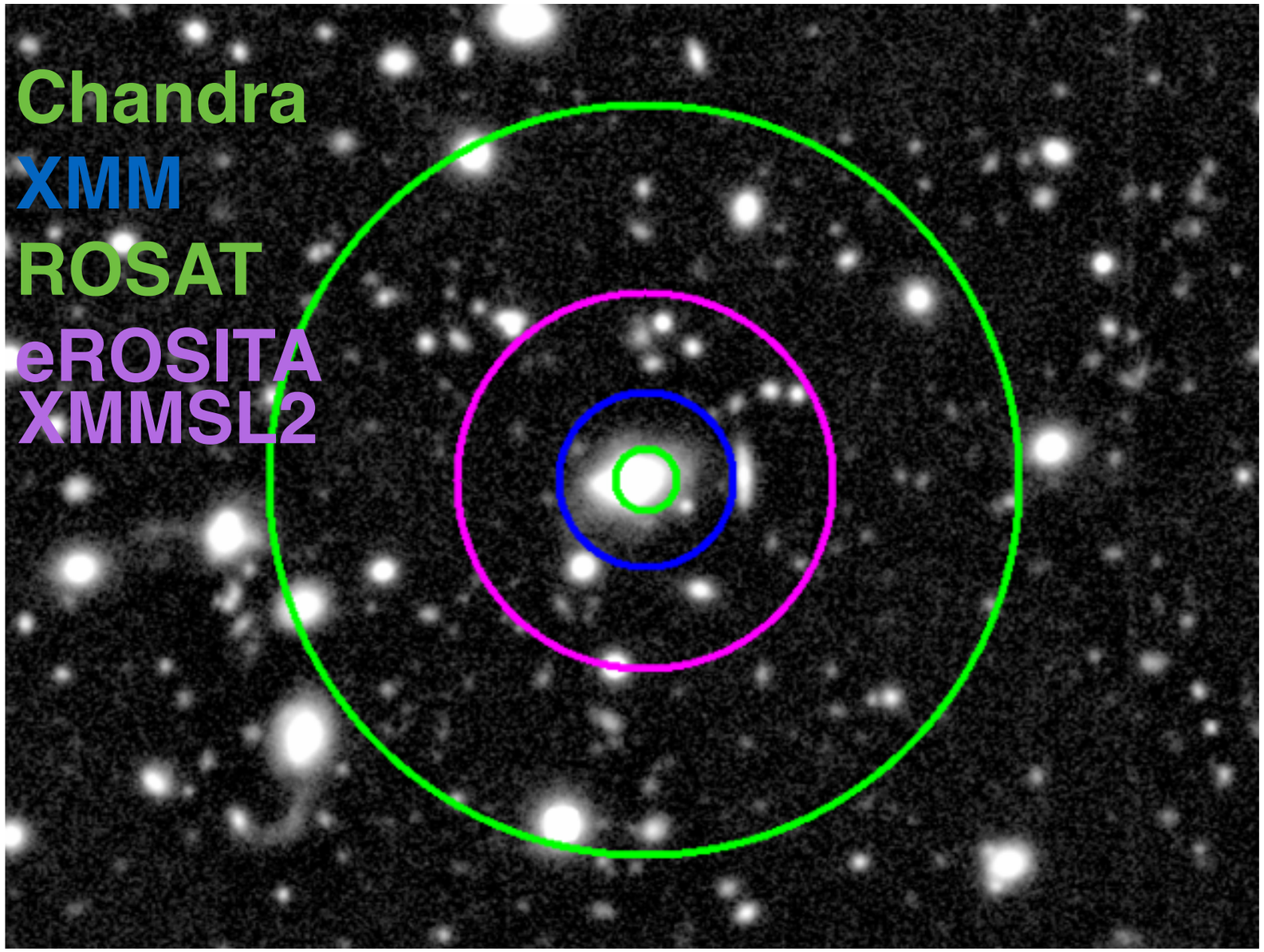

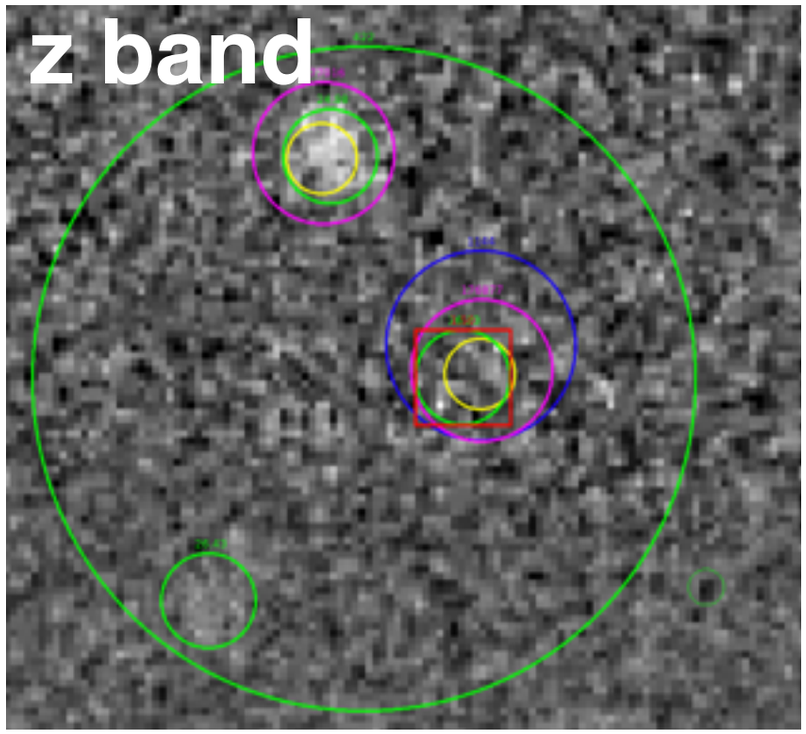

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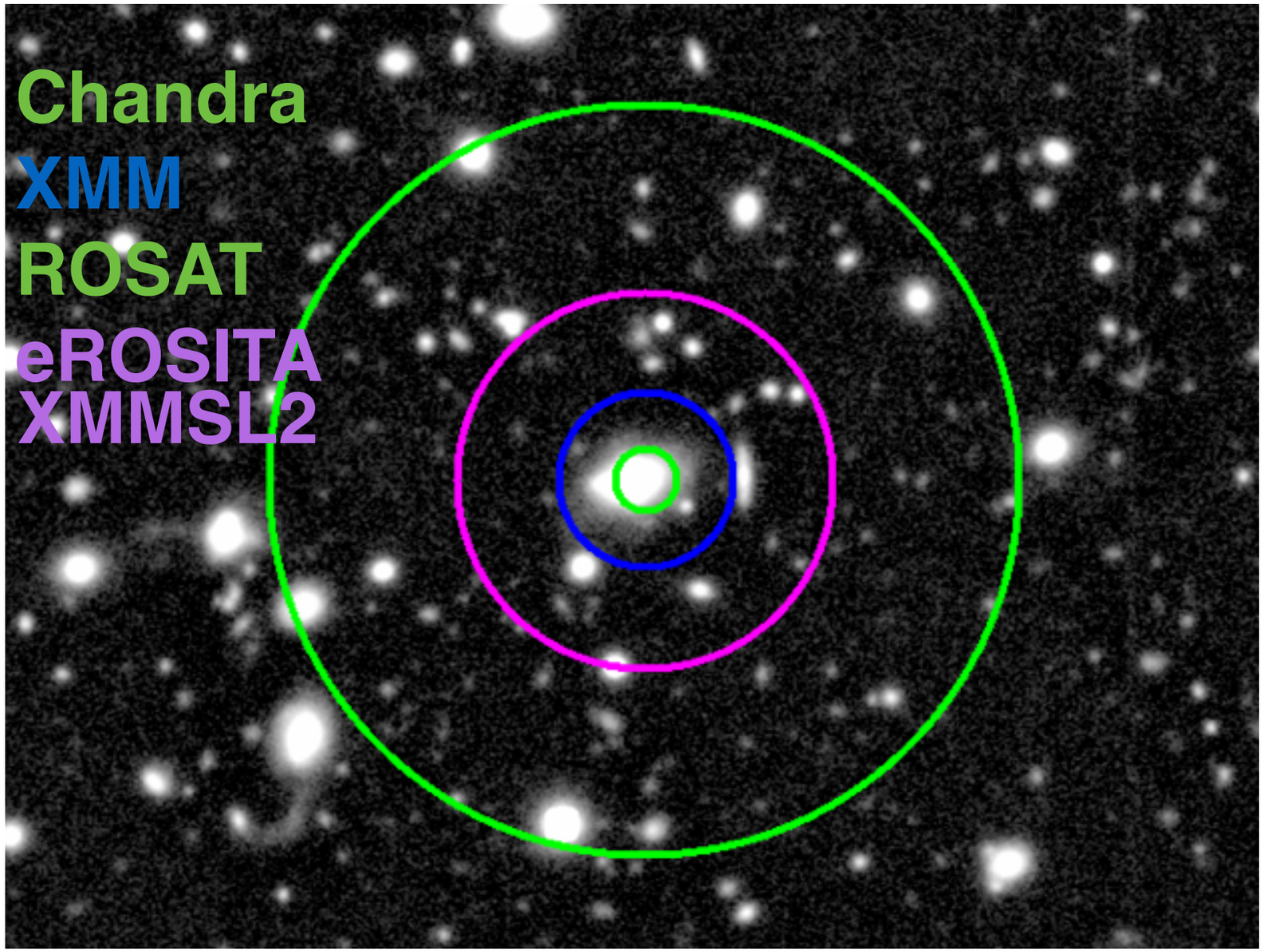

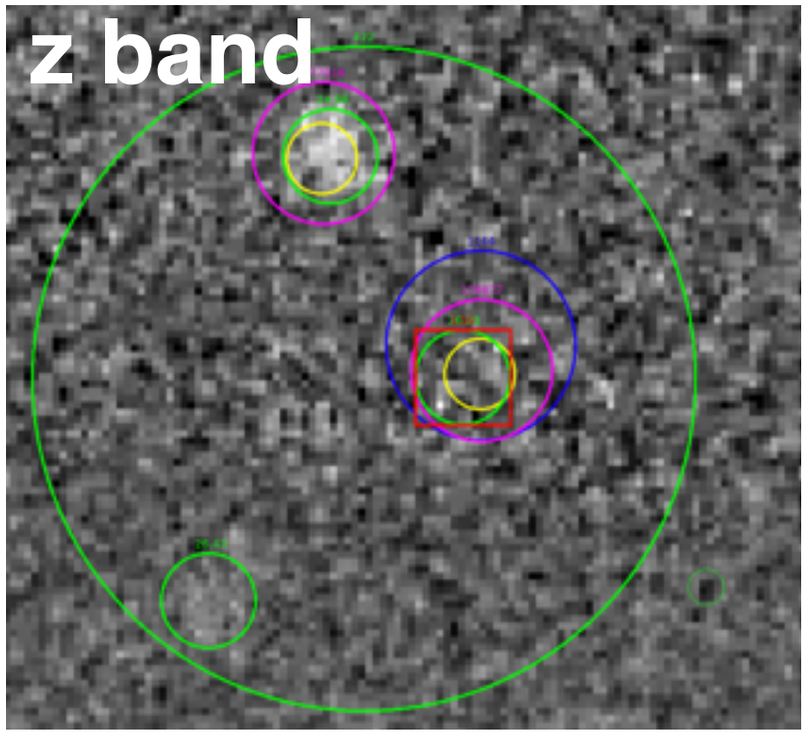

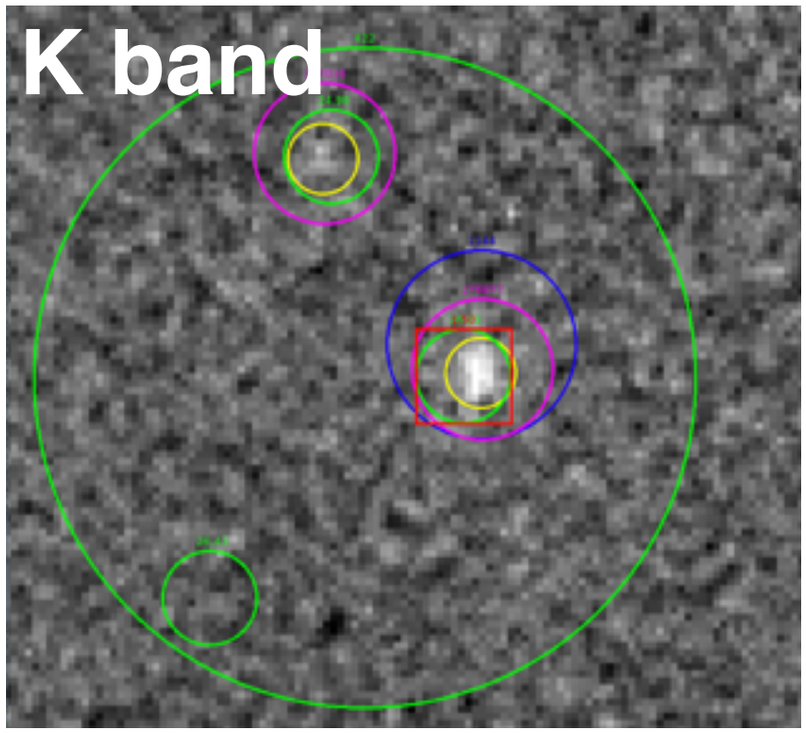

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NWAY in a nutshell

Salvato+ 2017, Dwelly+2017

number density, distances, positional errors

$$B' = B \times \prod \frac{\int_m \bar{q}(m)\, p(m|D_m)\, dm}{\int_m \bar{n}(m)\, p(m|D_m)\, dm}$$

various priors: magnitudes colors, morphology variability, etc

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Pineau+2017 better for pointed obs.

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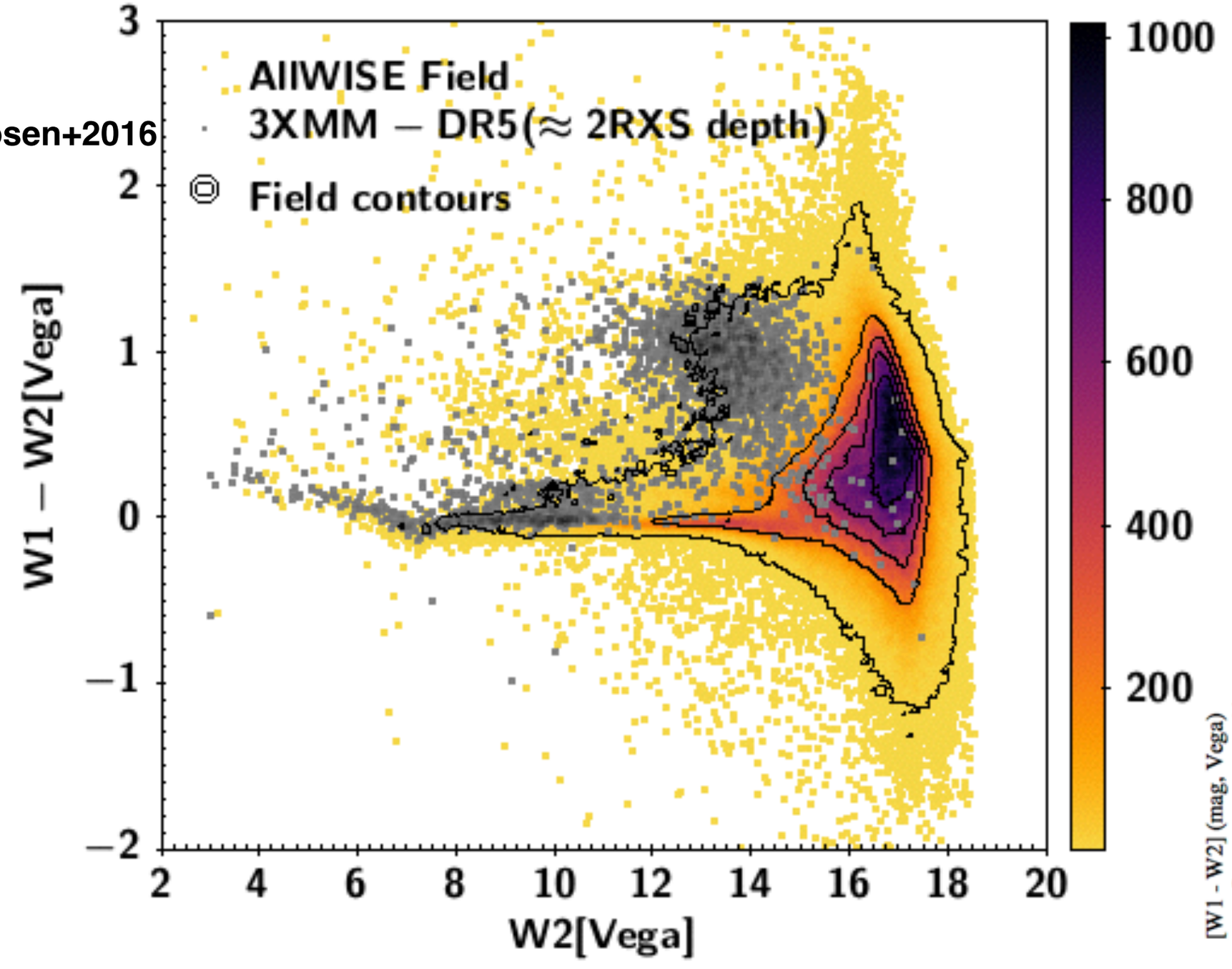
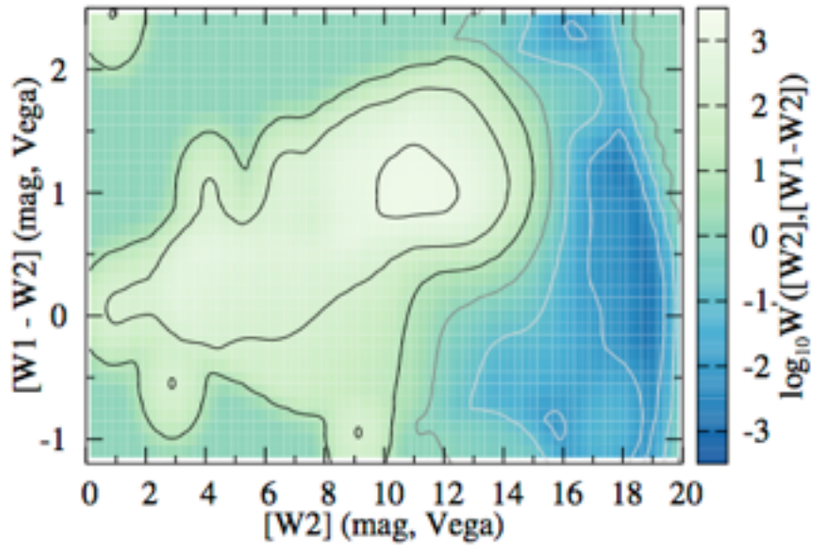
For 2RXS and XMMSL2: a MIR color-magnitude prior

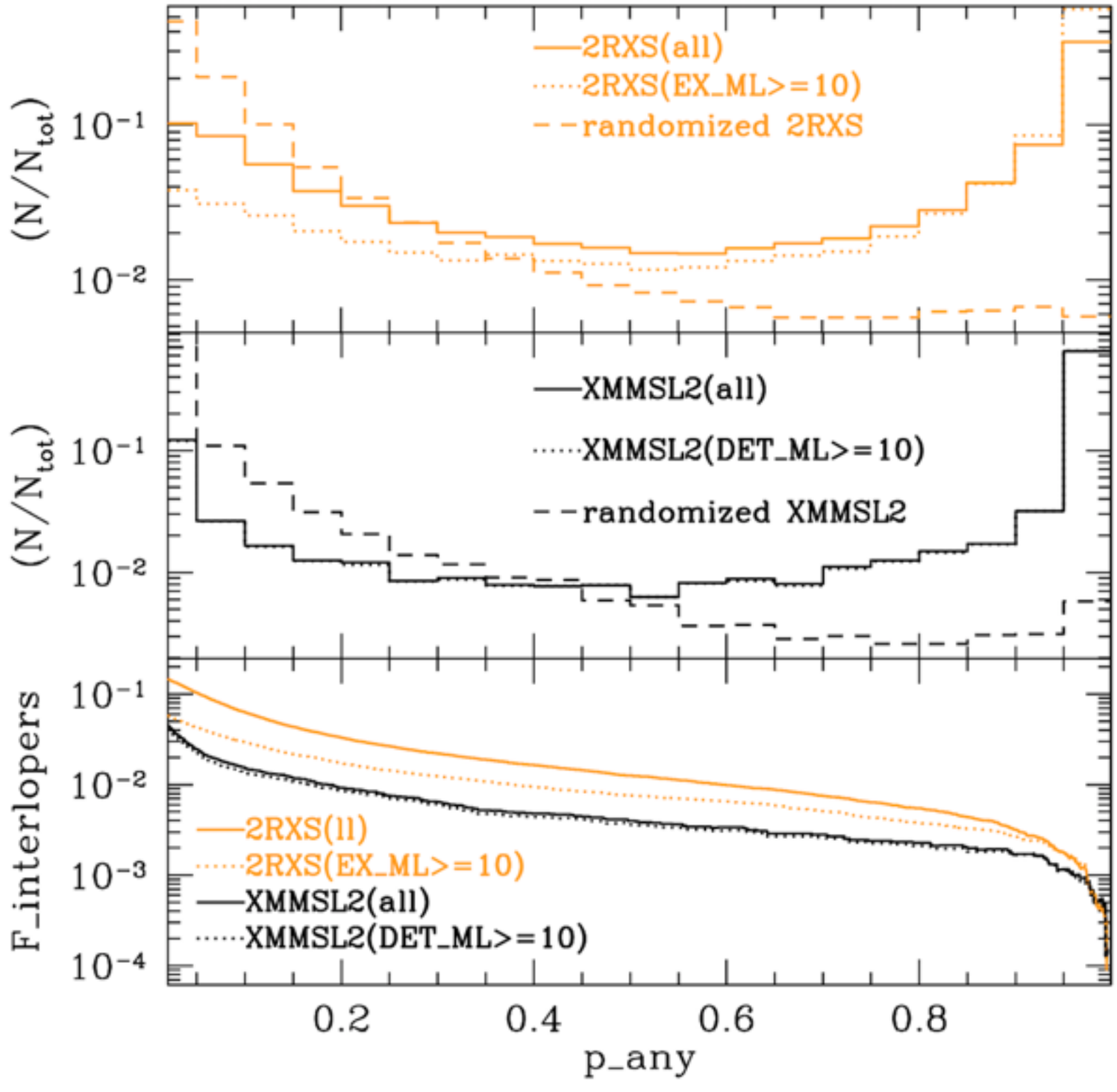
Dwelly+2017, Salvato+2017

Rosen+2016





Very little contamination from chance association



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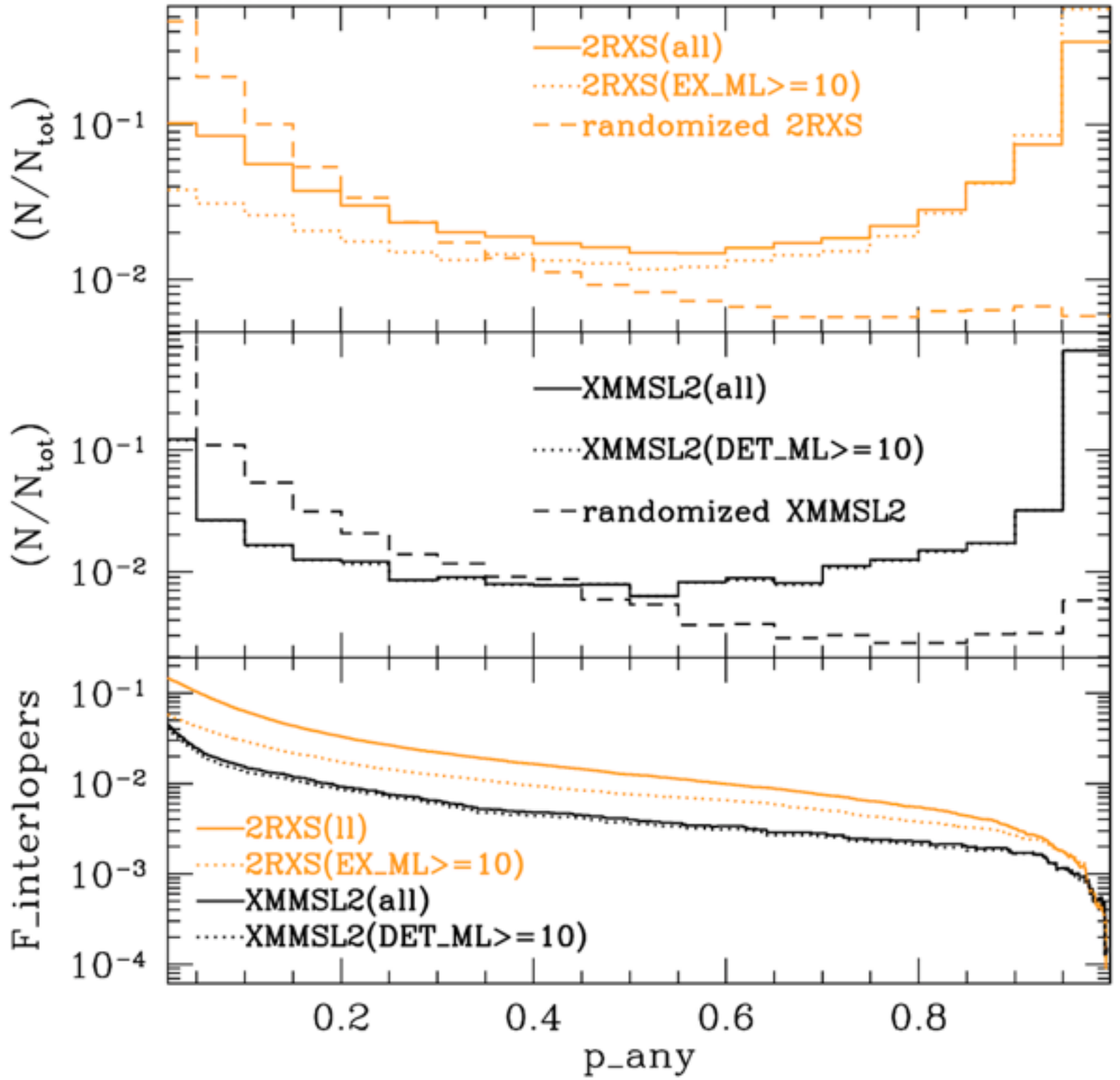
XMMSL-2RXS Separation arcsec	Sources in common N	Identical AllWISE ctp. %
Sep. ≤5	1111	98.5
Sep. ≤10	3448	98.7
Sep. *le*30	7834	96.1
Sep. *le*60	8768	93.0



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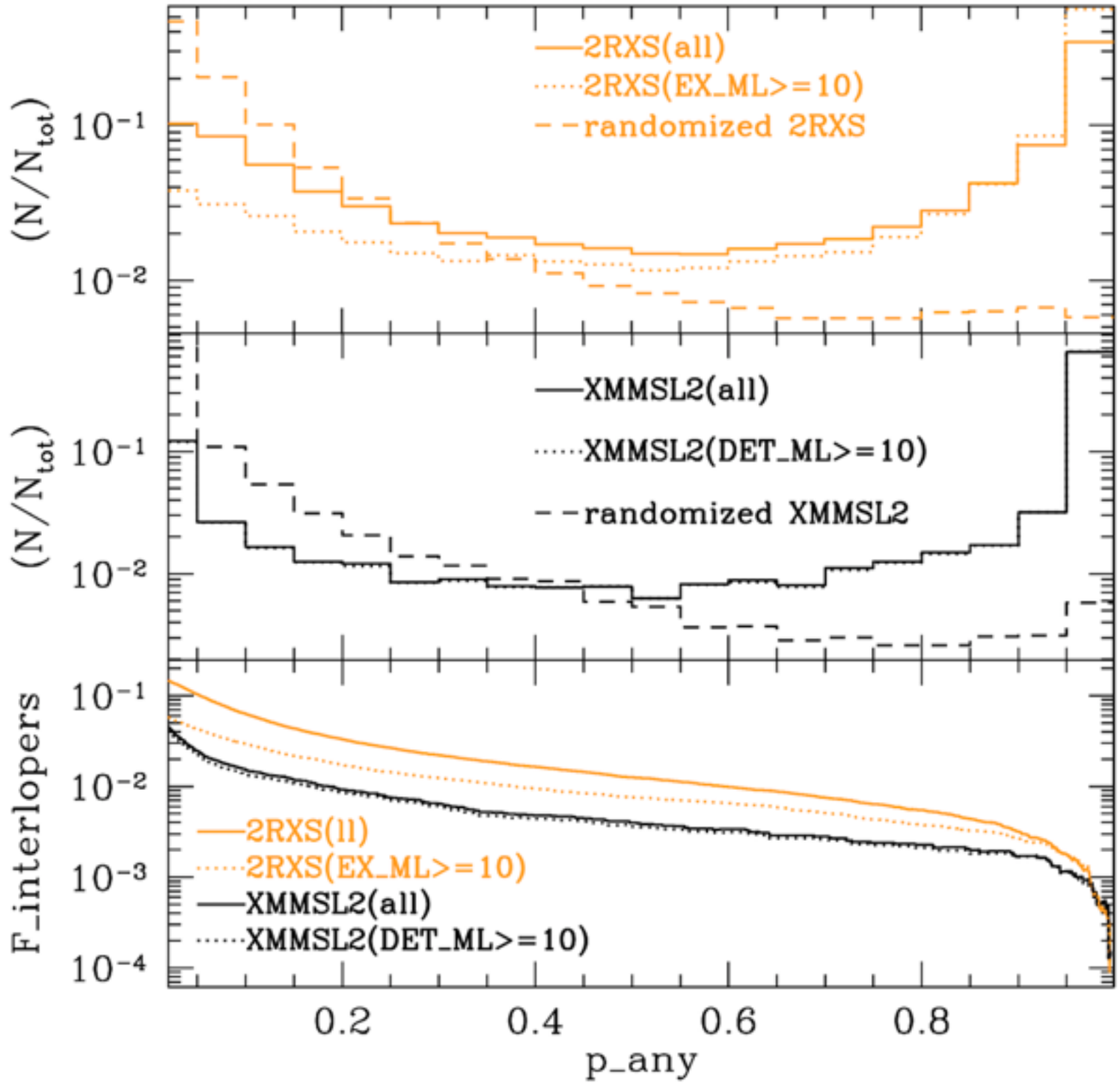
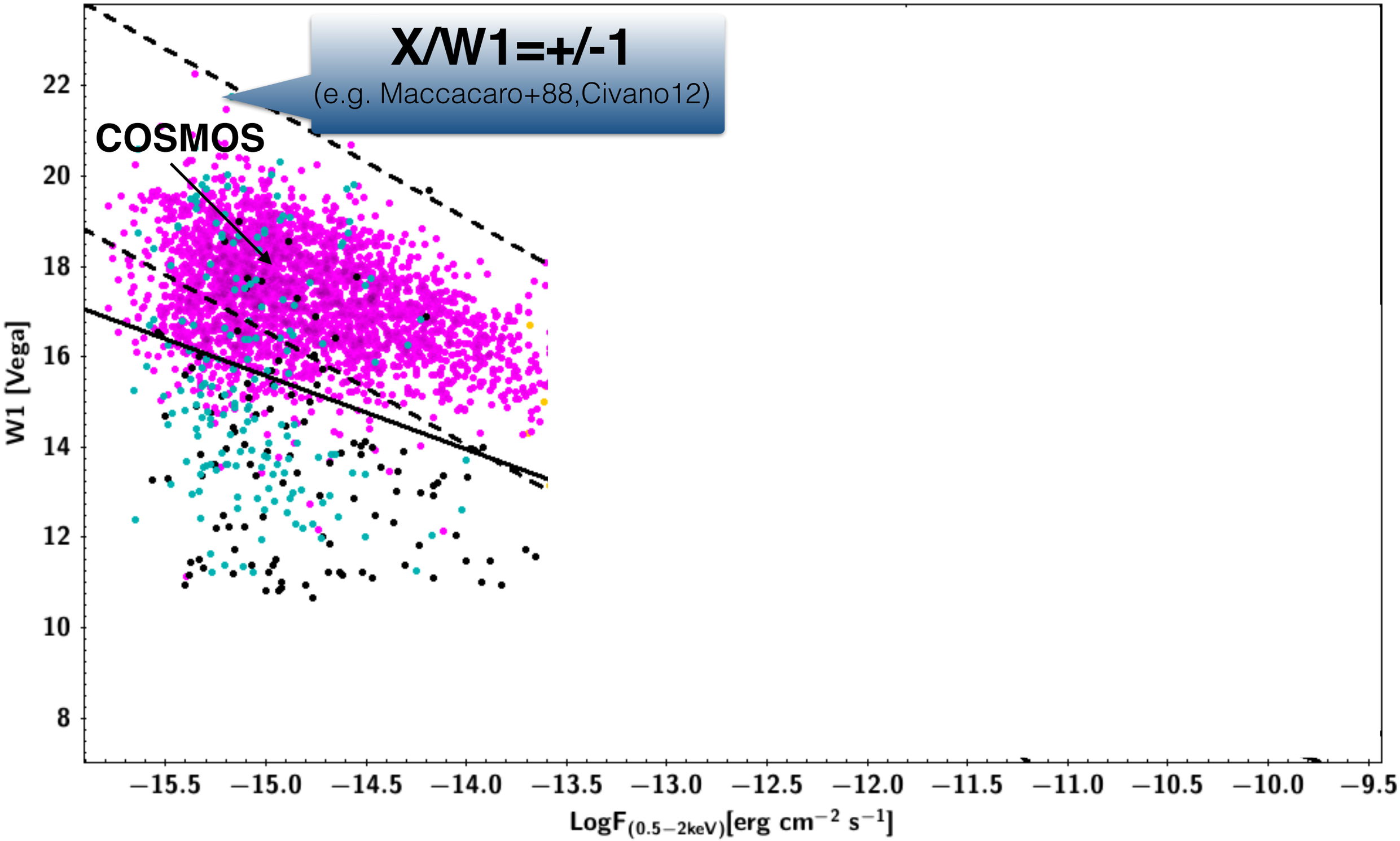
Using a sample
of ~1500 sources
from 3XMM
with secure ctp,
agreement at -97% level



Properties of counterparts



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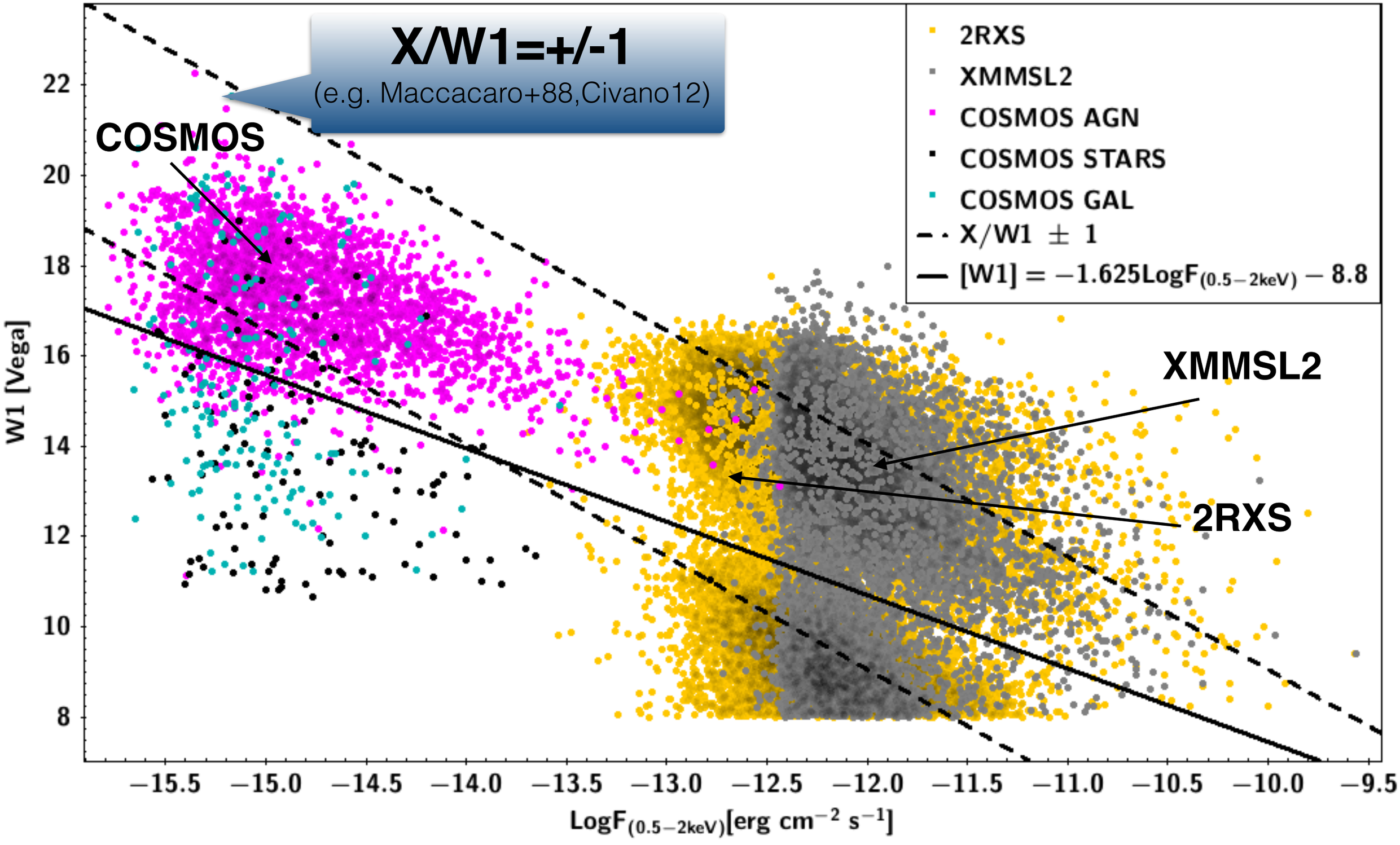

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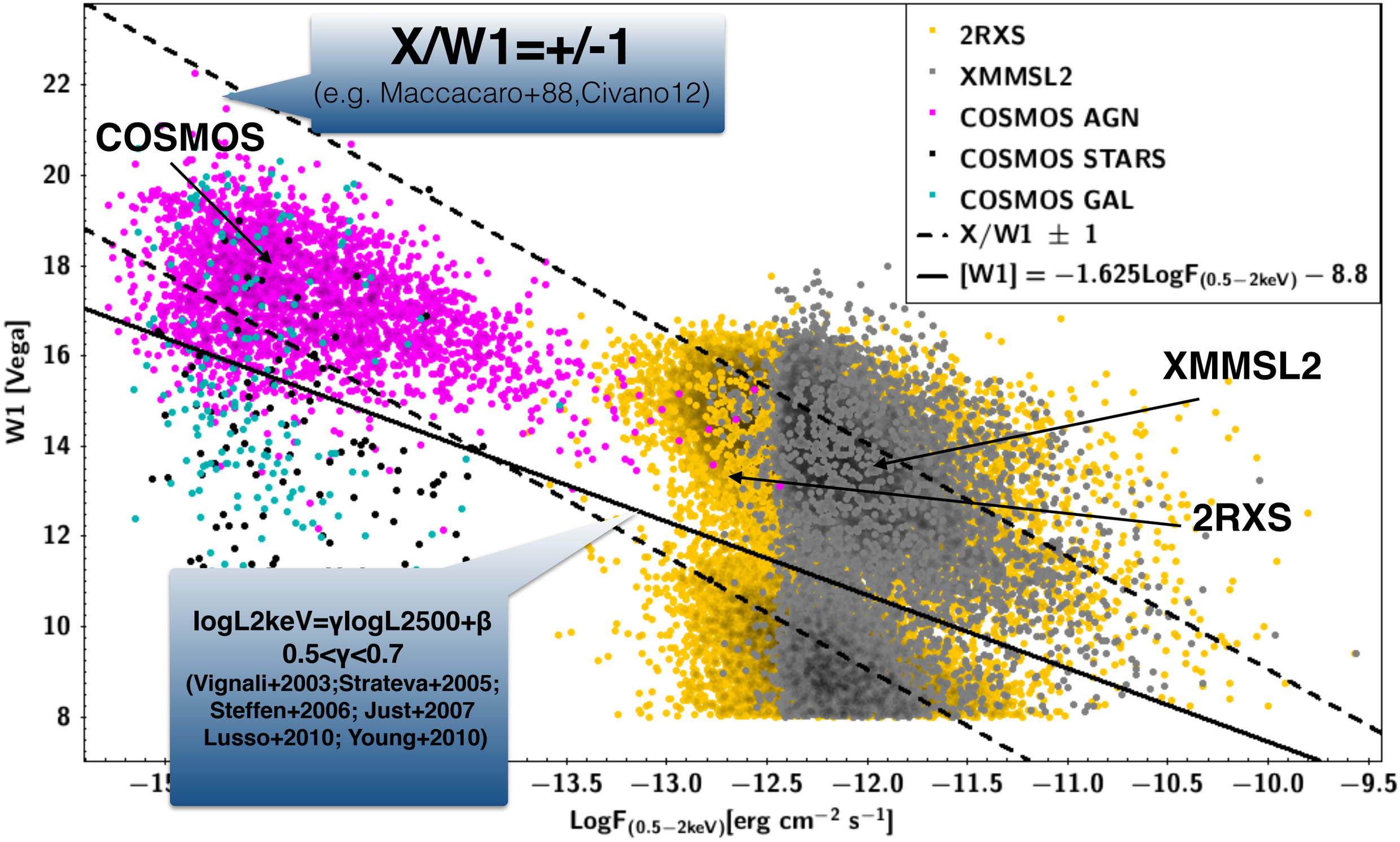

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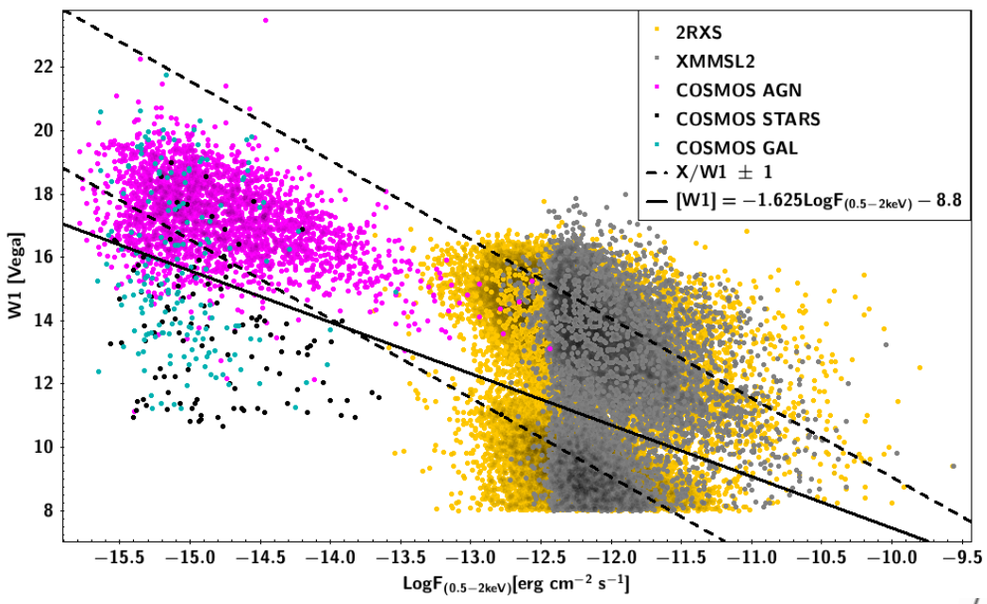

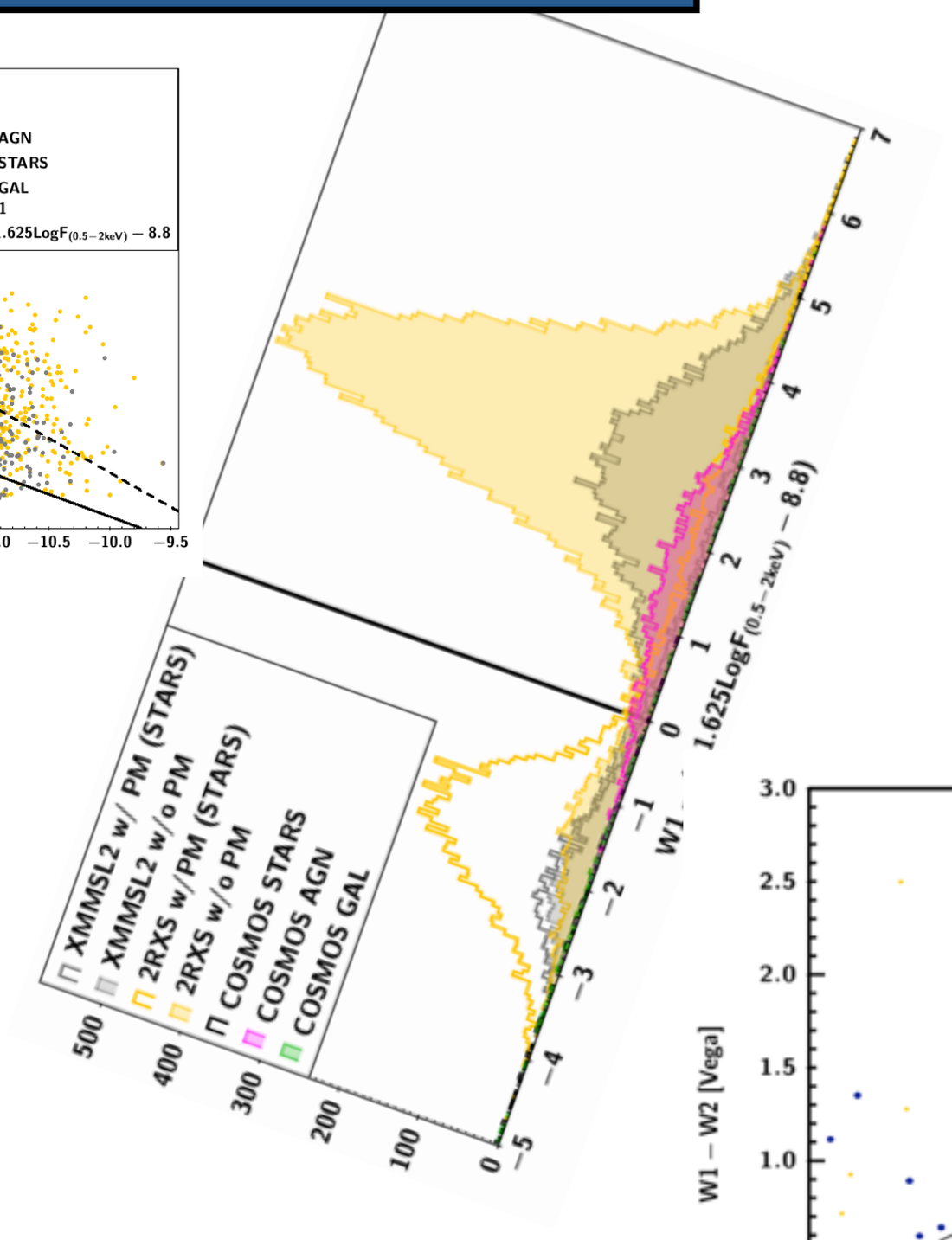

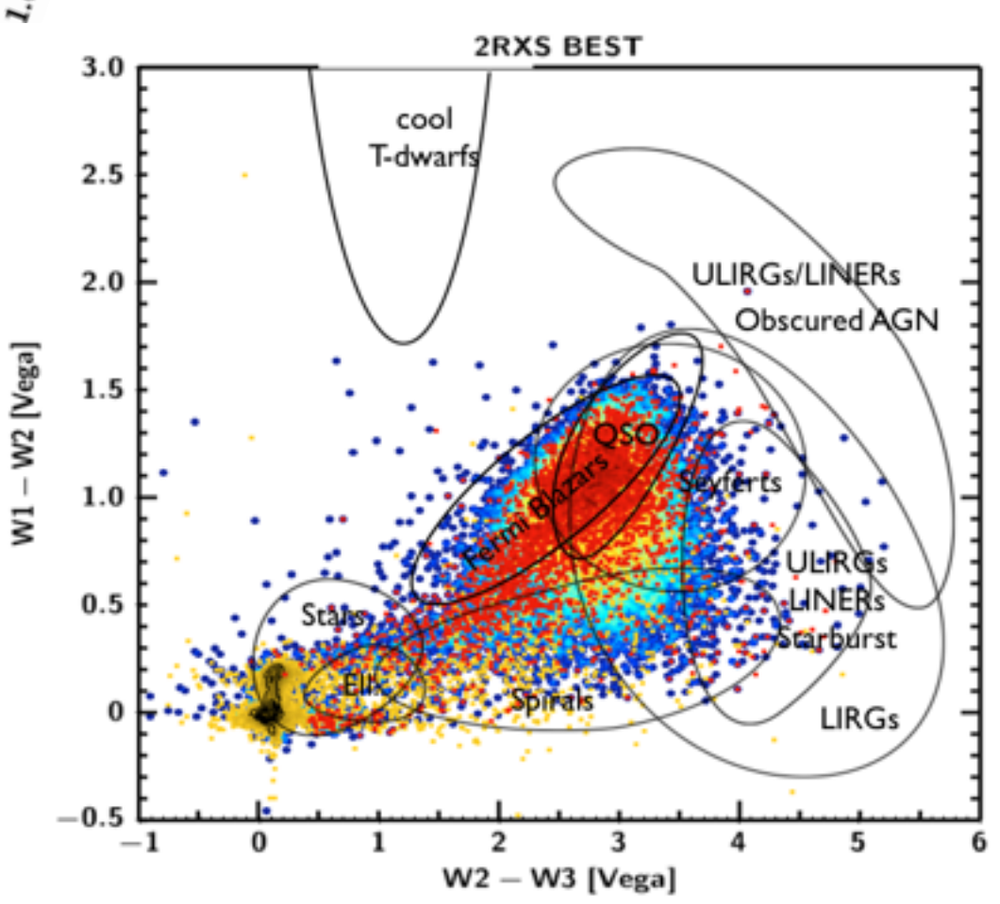

Summary

The counterparts to sources with large positional uncertainties (X-ray, IR), are more secure when we rely on as many observational information as possible.

We developed and released Nway, a code that based on Bayesian statistics allows to consider at once, astrometry and physical properties of candidate counterparts, opposed to those of field sources.

For 2RXS and XMMSL2 we defined a MIR color-magnitude prior. Based on a well understood spectroscopic sample we claim a reliable counterpart for at least ~97% of the X-ray sources, with a small fraction of spurious associations.

A slope of -1.625 between W1 and logFx separate well the counterparts that are AGN dominated from the stars.

In https://arxiv.org/abs/1705.10711 we released the counterparts to 2RXS and XMMSL2 for |b|>15. For the galactic plane we need to define a different prior. Soon we will release also the spectroscopic follow-up of the sources in the eBOSS/ SPIDERS footprints (DR14: Merloni +18). Recently we have released the ctps of 1RXS and XMMSL1 up to DR12 in the same area (Dwelly+17)