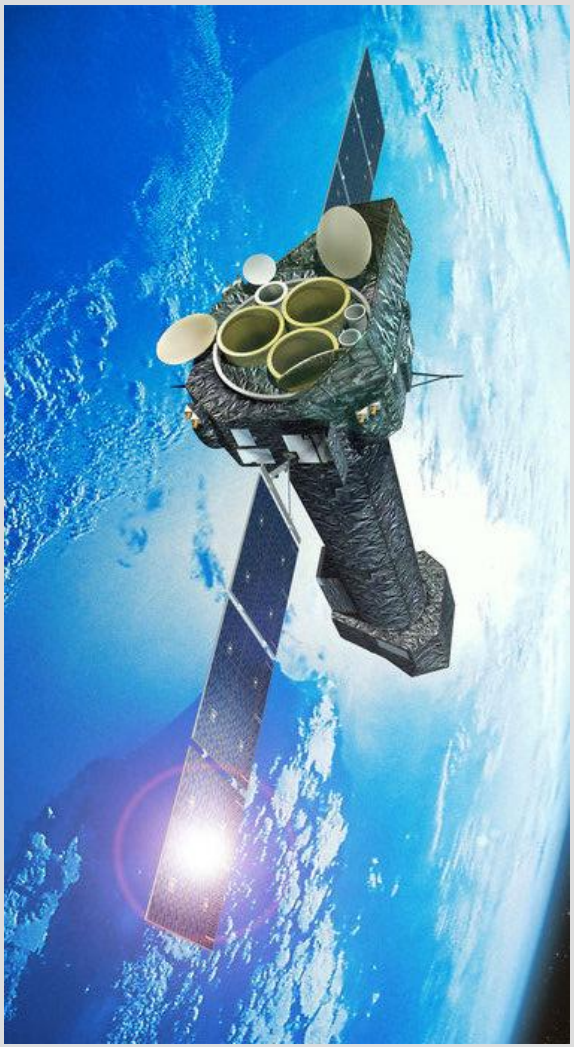
The Complete XMM-SERVS Survey: A Sensitive X-ray Survey of the LSST Deep-Drilling Fields

W.N. Brandt (Penn State), Q. Ni (Penn State), for the XMM-SERVS Team



Qingling Ni,[1,2,*] W. N. Brandt,[1,2,3] Chien-Ting Chen,[4] Bin Luo,[5,6] Kristina Nyland,[7] Guang Yang,[8,9] Fan Zou,[1,2] James Aird,[10] David M. Alexander,[11] Franz Erik Bauer,[12,13,14] Mark Lacy,[15] Bret D. Lehmer,[16] Labani Mallick,[17] Mara Salvato,[18] Donald P. Schneider,[1,2] Paolo Tozzi,[19] Iris Traulsen,[20] Mattia Vaccari,[21,22] Cristian Vignali,[23,24] Fabio Vito,[25] Yongquan Xue,[26,27] Manda Banerji,[28,29] Kate Chow,[30] Andrea Comastri,[24] Agnese Del Moro,[31] Roberto Gilli,[24] James Mullaney,[32] Maurizio Paolillo,[33,34,35] Axel Schwope,[20] Ohad Shemmer,[36] Mouyuan Sun,[37] John D. Timlin III,[1,2] and Jonathan R. Trump[38]

Large Effective Area (~ 2000 cm^2)

Good Field of View (~ 800 $arcmin^2$)

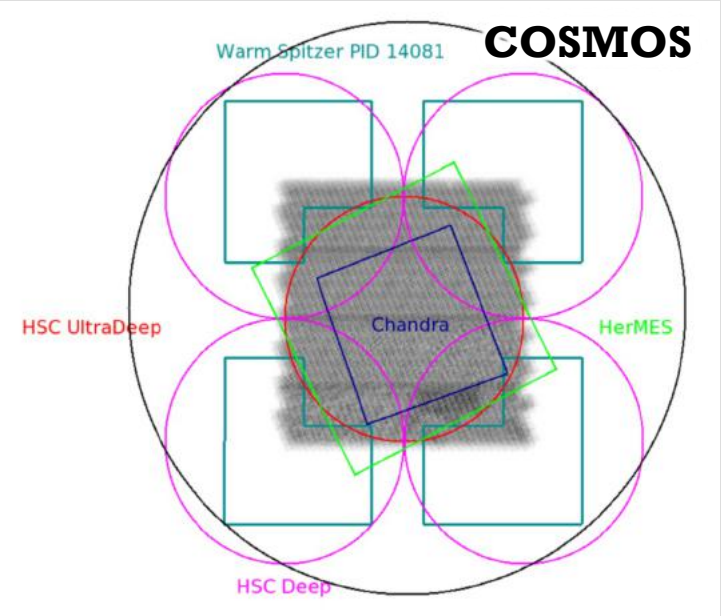
Good Angular Resolution

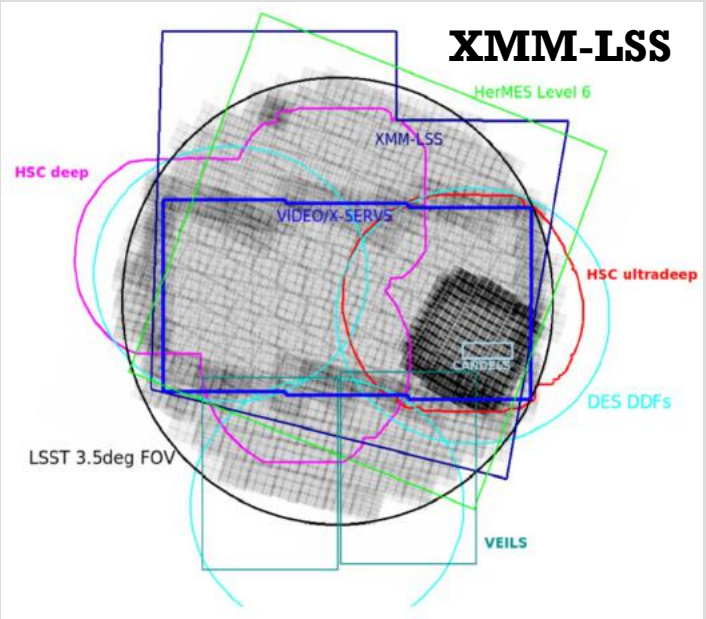
Broad Bandpass (0.3-10 keV)

Healthy – hopefully, 10+ more years


Rubin Observatory
Will conduct Legacy Survey of Space and Time (LSST)
Main survey over ~ 18000 deg^2
Also "mini-surveys" for ~ 10% of time

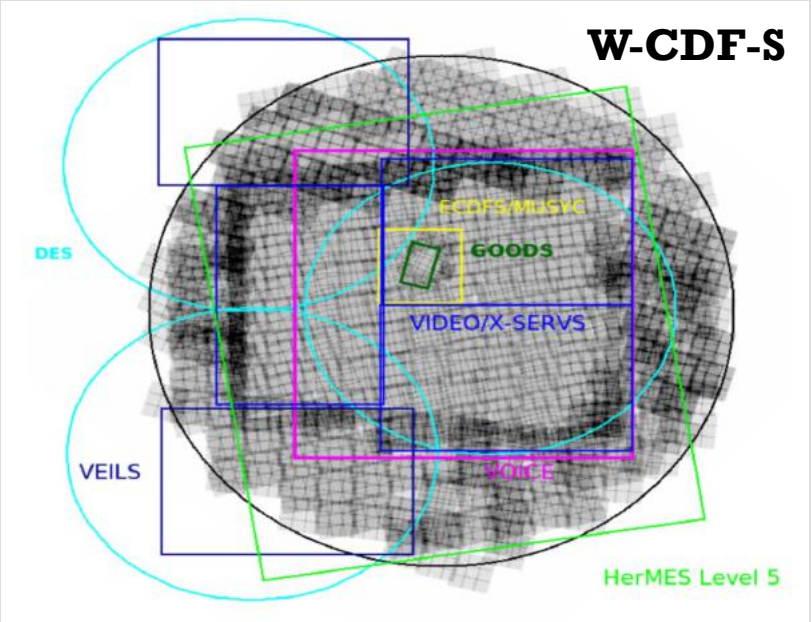
Rubin's LSST Deep-Drilling Fields

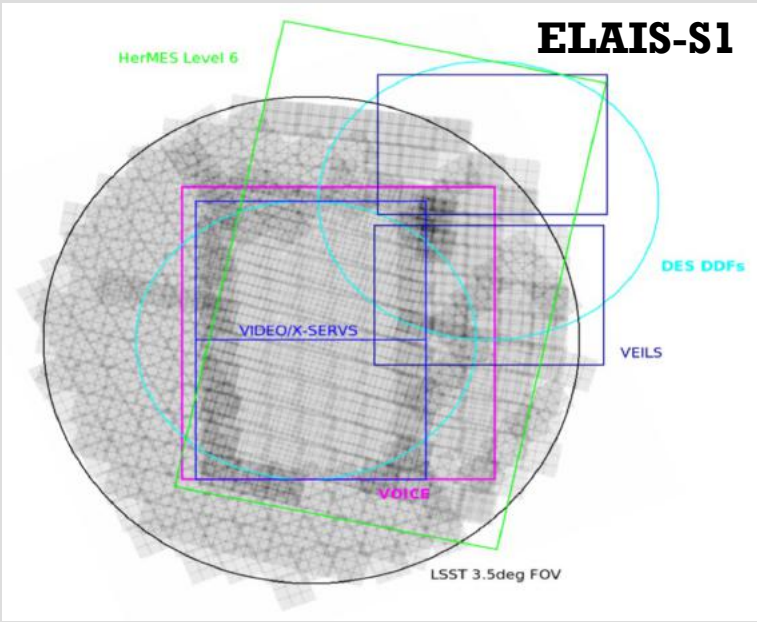


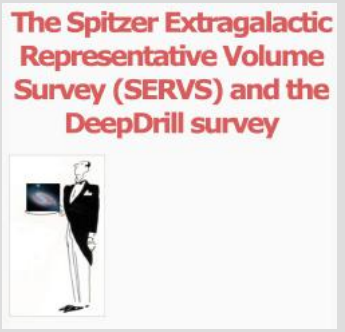


Each LSST field is 10 deg^2 (large black circles).

Likely will observe every 2-3 nights in *grizy* when visible for 10 yr (also *u*).

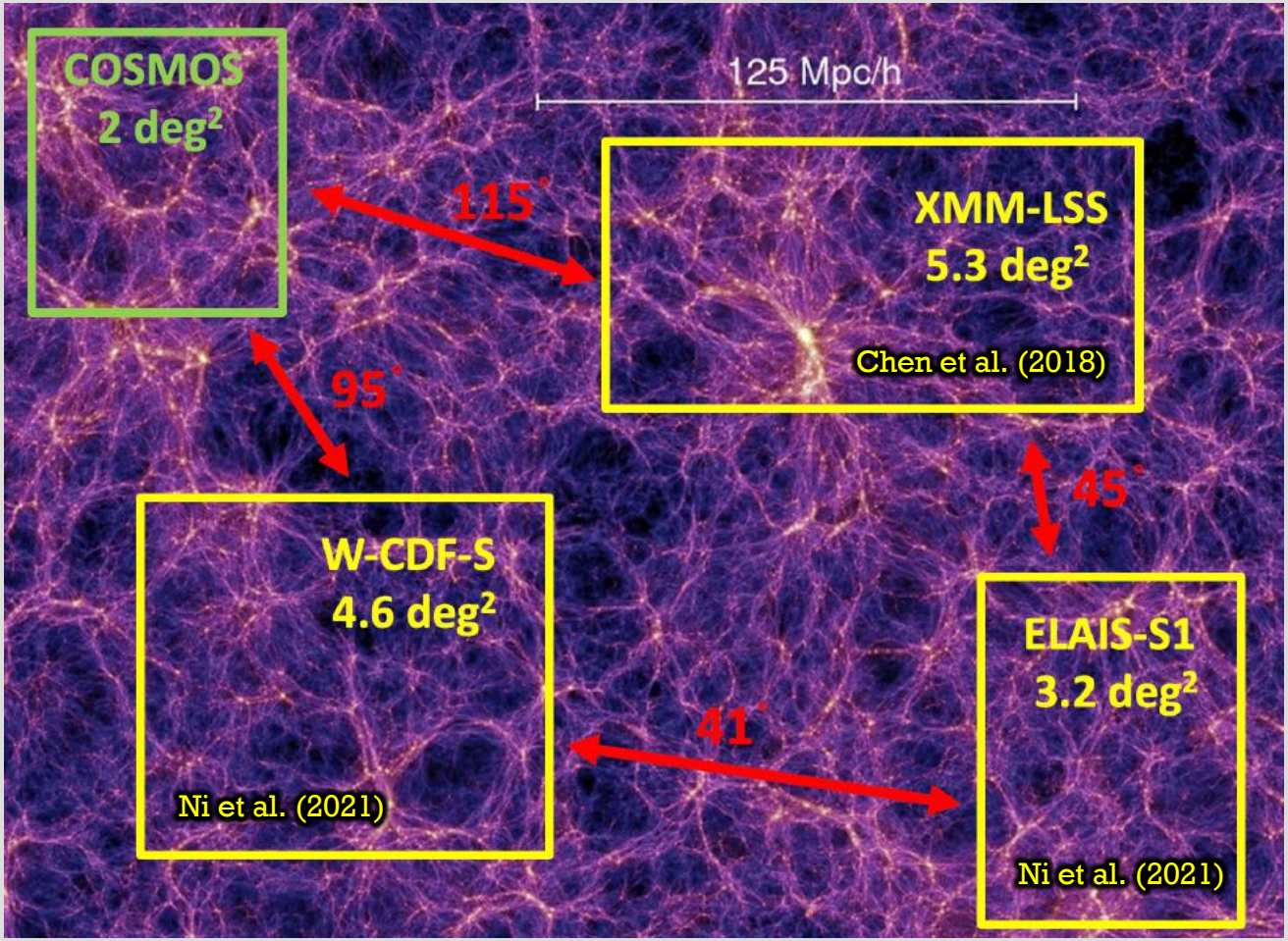




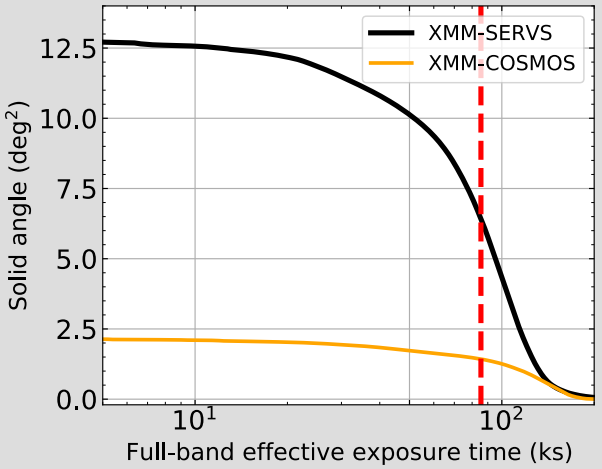


Brandt et al. (2018)
arXiv:1811.06542

The 5 Ms XMM-SERVS Heritage Program



Sky Coverage of
XMM-SERVS vs. XMM-COSMOS



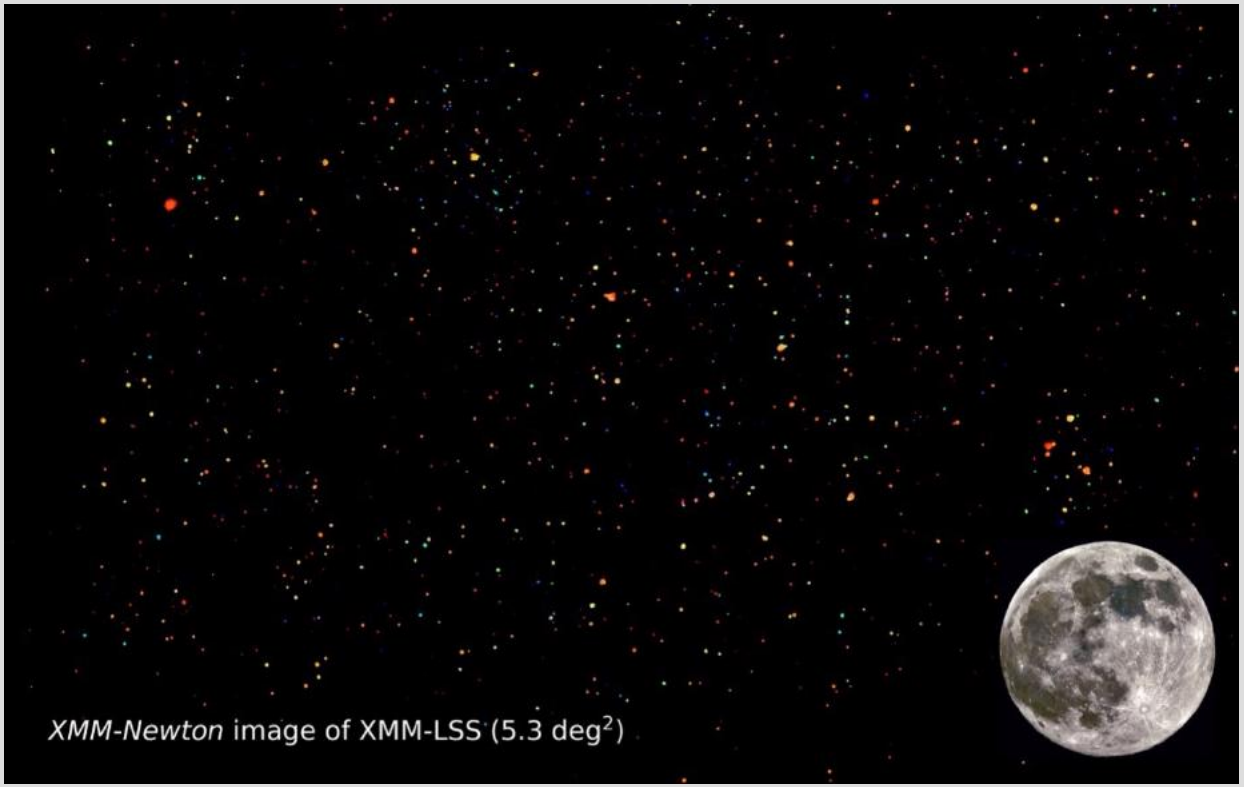
At uniform 50 ks XMM-Newton depth, detect ~ 10,200 AGNs and many X-ray groups/clusters.

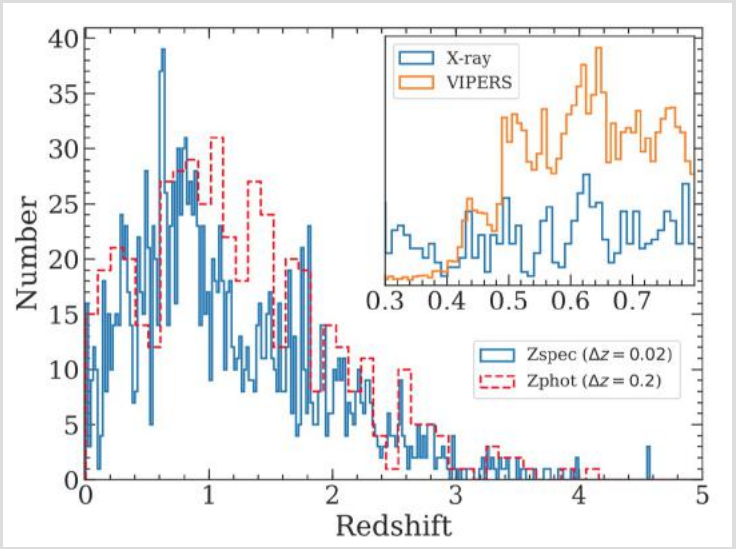
SMBH growth across the full range of cosmic environments and SMBH/galaxy connections.

Great legacy value as LSST/DES DDFs and MOONS/PFS, TolTEC/ALMA, & MOS-RM fields.

Ground-truth AGN sample for calibrating LSST AGN selection in DDFs and main survey.

Results from the XMM-LSS Field



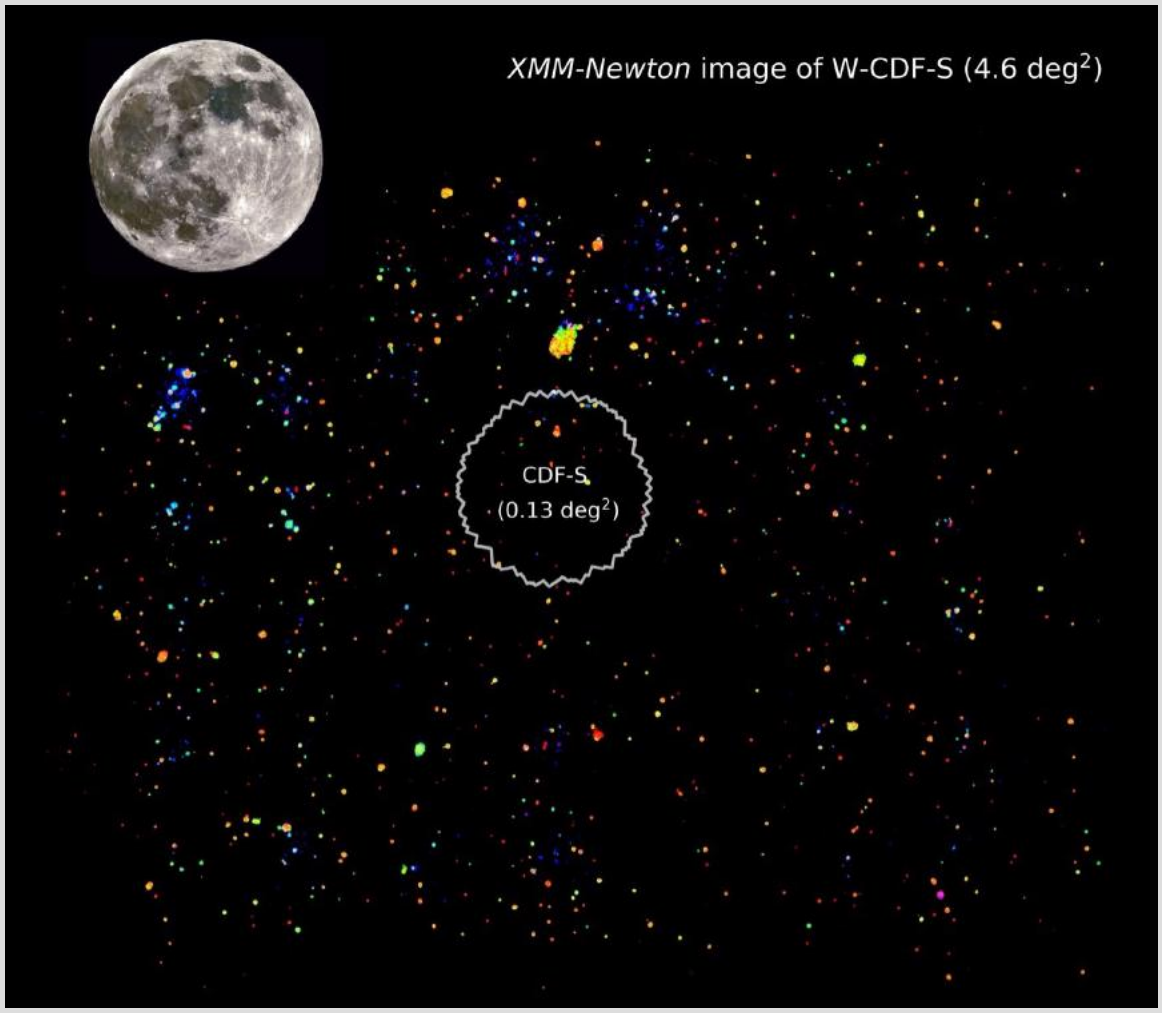


Chen et al. (2018)

5242 total X-ray sources - 90% good identification rate (assessed with Chandra)

In our prime 4.5 deg^2, more than 70% of sources have spectroscopic or high-quality photometric redshifts.

W-CDF-S Now Submitted!



Ni et al., submitted

80 observations done with total good exposure of 1.8 Ms, covering 4.6 deg^2.

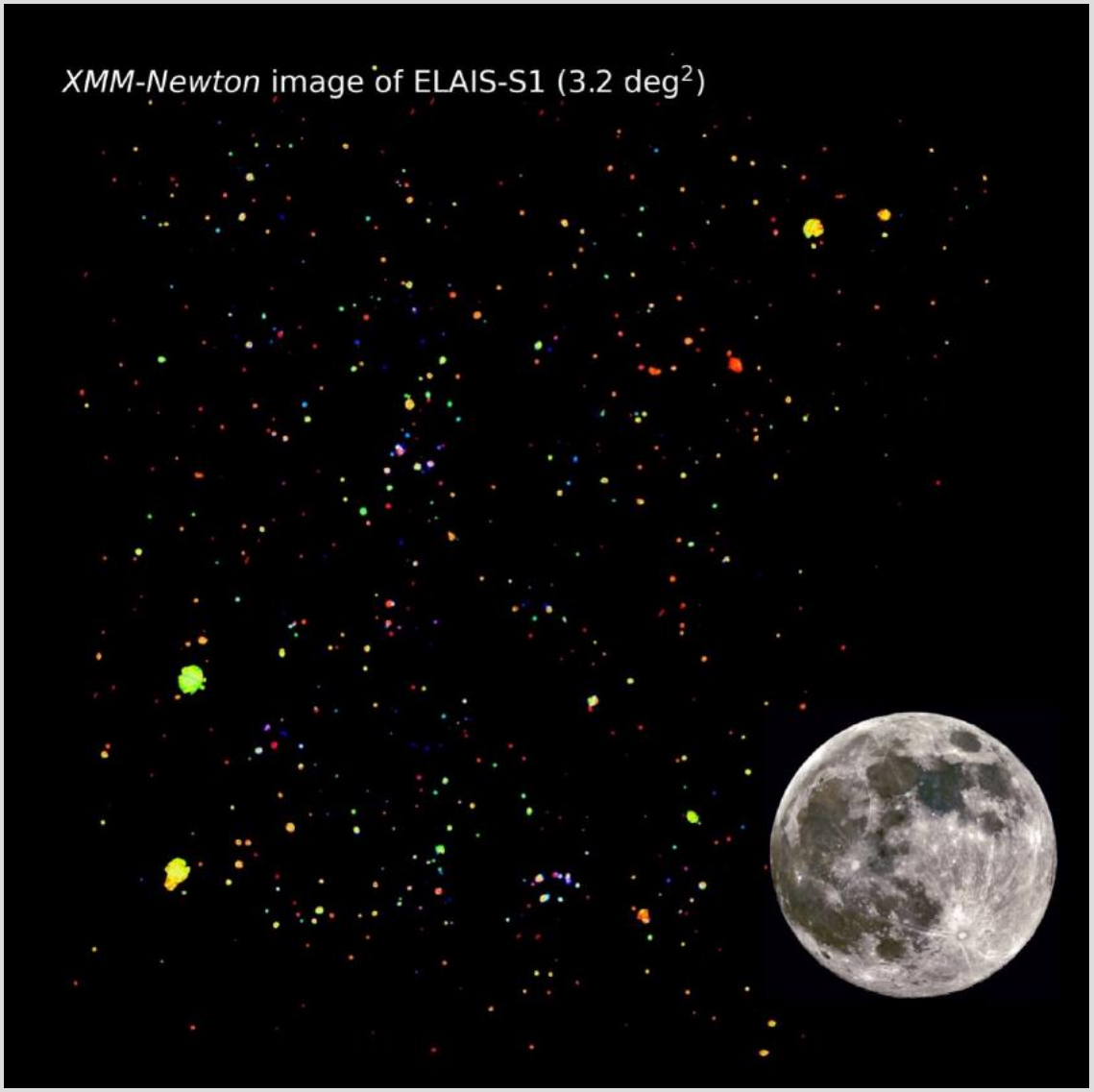
Background flaring fine overall; used re-observations to fill "holes" for exposure uniformity.

4053 X-ray sources detected, and almost all are new!

89% have reliable multiwavelength counterparts in Spitzer/VIDEO/HSC.

68% have spec-*z* or high-quality photo-*z* (83% in prime multi-λ area).

ELAIS-S1 Now Submitted!



31 observations done with total good exposure of 0.9 Ms, covering 3.2 deg^2.

Modest background flaring.

2630 X-ray sources detected.

87% have reliable multiwavelength counterparts in Spitzer/VIDEO/DES.

65% have spec-*z* or high-quality photo-*z* (85% in prime multi-λ area).

Ni et al., submitted

Source Numbers Summary

For all three XMM-SERVS fields together, detect

11,900 X-ray point sources

10,200 AGNs (86%)

About 2800 Type 1 AGNs (27%)

About 7400 non-Type 1 AGNs (73%)

About 1250 galaxies and 450 stars

XMM-SERVS point-source sky density is ~ 910 deg^{-2}
compared to ~ 170 deg^{-2} typically for eROSITA
(and XMM-Newton positions considerably better).

1.6 Million Photometric Redshifts

OPEN ACCESS

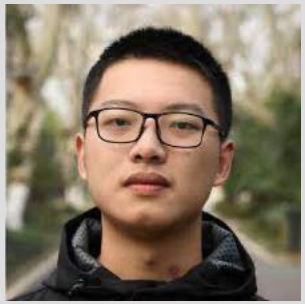
Photometric Redshifts in the W-CDF-S and ELAIS-S1 Fields Based on Forced Photometry from 0.36 to 4.5 Microns

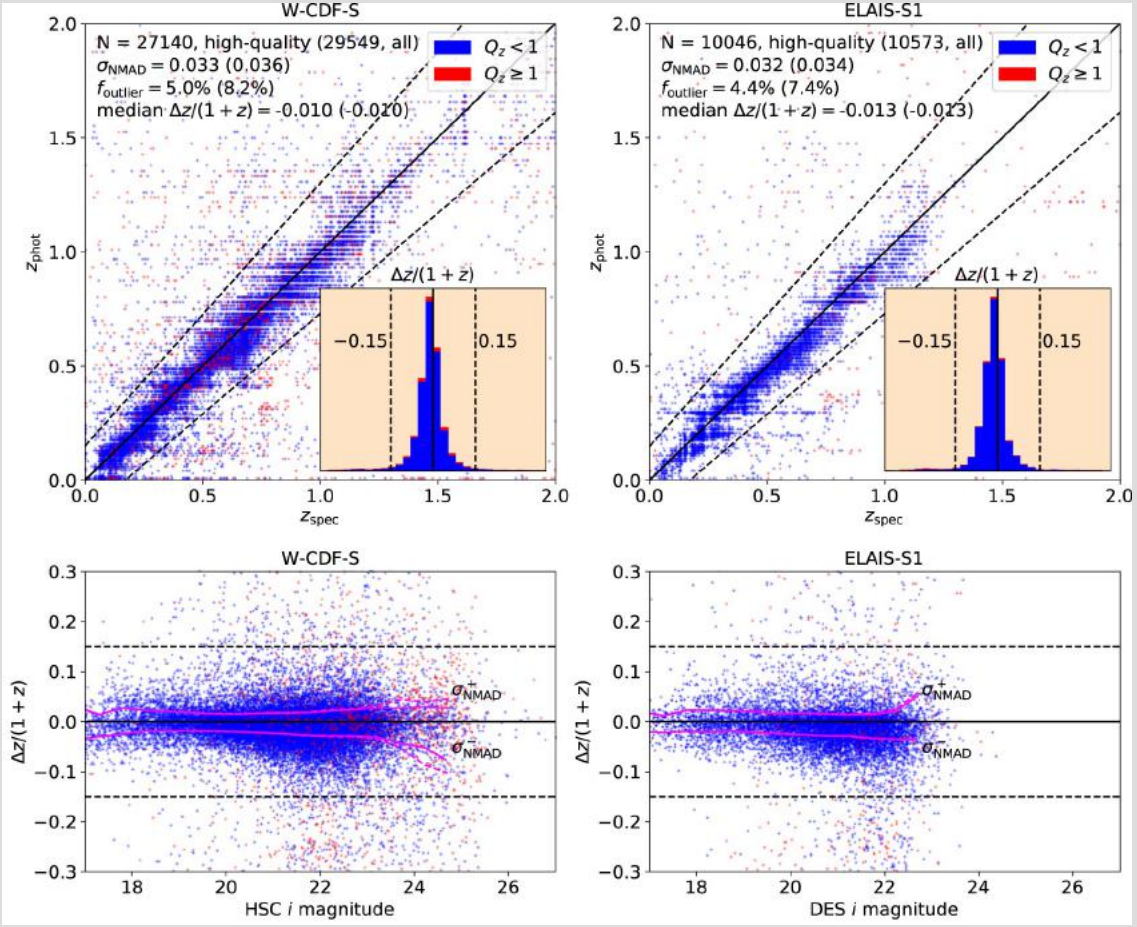
Fan Zou[1,2], Guang Yang[3,4], W. N. Brandt[1,2,5], Qingling Ni[1,2], Franz E. Bauer[6,7,8], Giovanni Covone[9,10,11], Mark Lacy[12], Nicola R. Napolitano[9], Kristina Nyland[13], Maurizio Paolillo[9,10,11] + Show full author list

Published March 2021 • © 2021. The Author(s). Published by the American Astronomical Society.

Research Notes of the AAS, Volume 5, Number 3

Citation Fan Zou *et al* 2021 *Res. Notes AAS* **5** 56



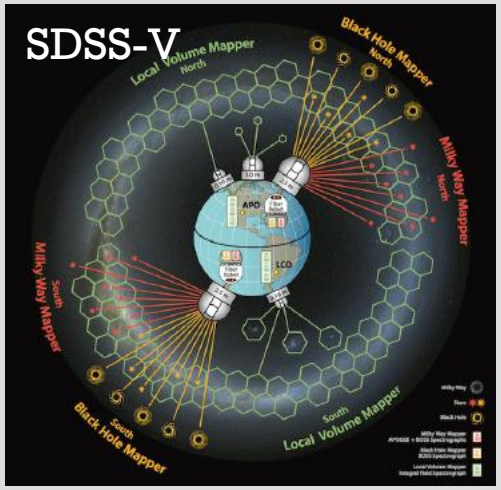


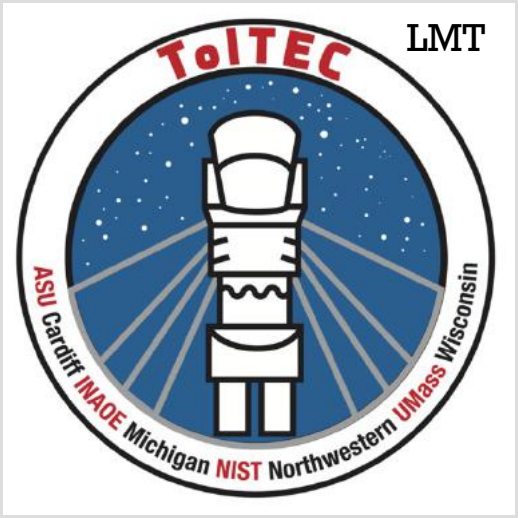
Also have delivered:

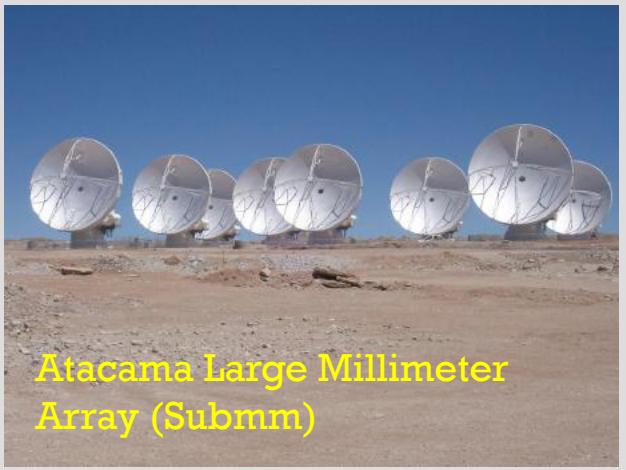
HSC imaging catalog for W-CDF-S - Ni et al. (2019)

Multi-band forced photometry catalogs for ELAIS-S1 and W-CDF-S – Zou et al. (2021) and Nyland et al. (in prep)

Complementary Multiwavelength Data Flooding In for XMM-SERVS!



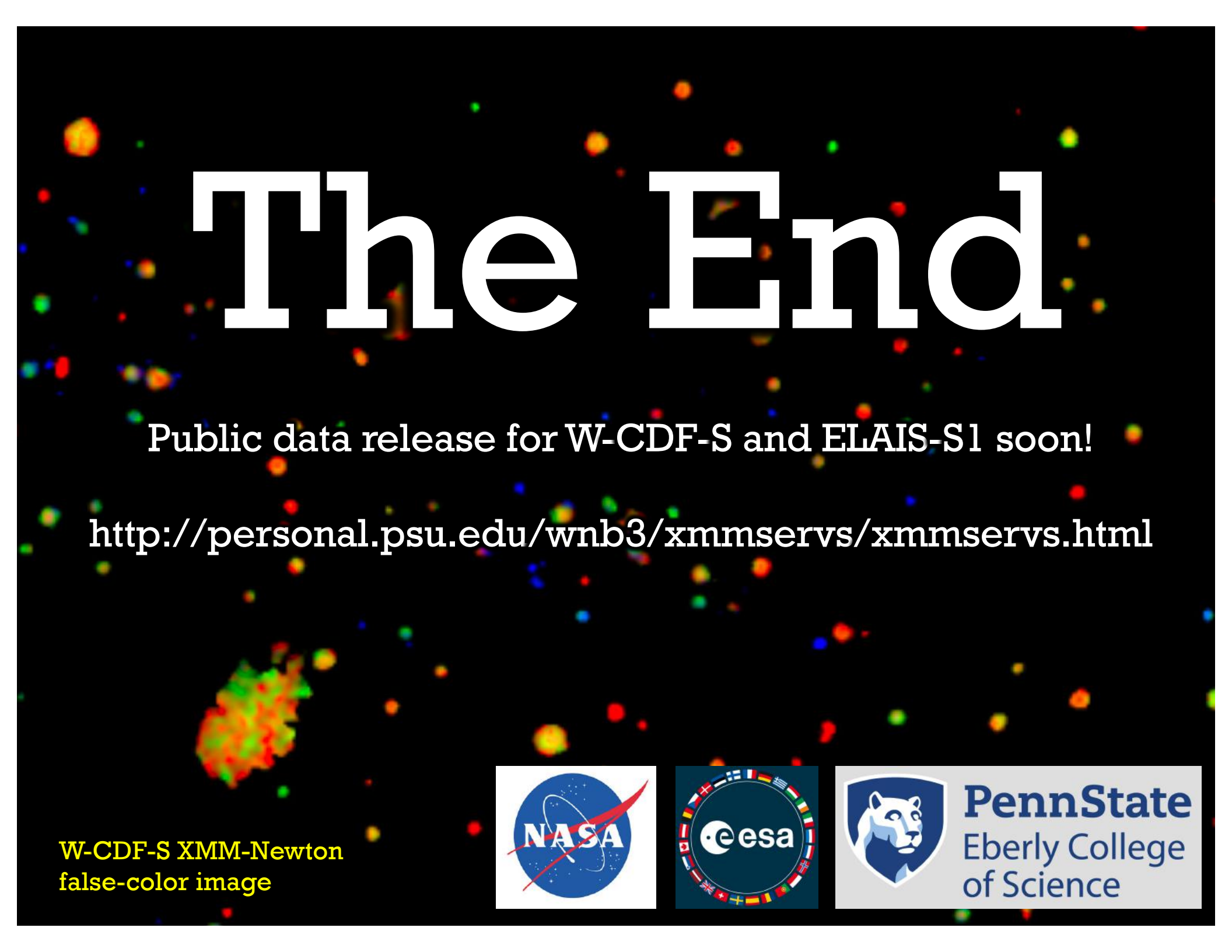




The End

Public data release for W-CDF-S and ELAIS-S1 soon!

http://personal.psu.edu/wnb3/xmmservs/xmmservs.html



W-CDF-S XMM-Newton
false-color image

PennState
Eberly College
of Science