Blank survey cluster samples for GL-to-X-ray studies

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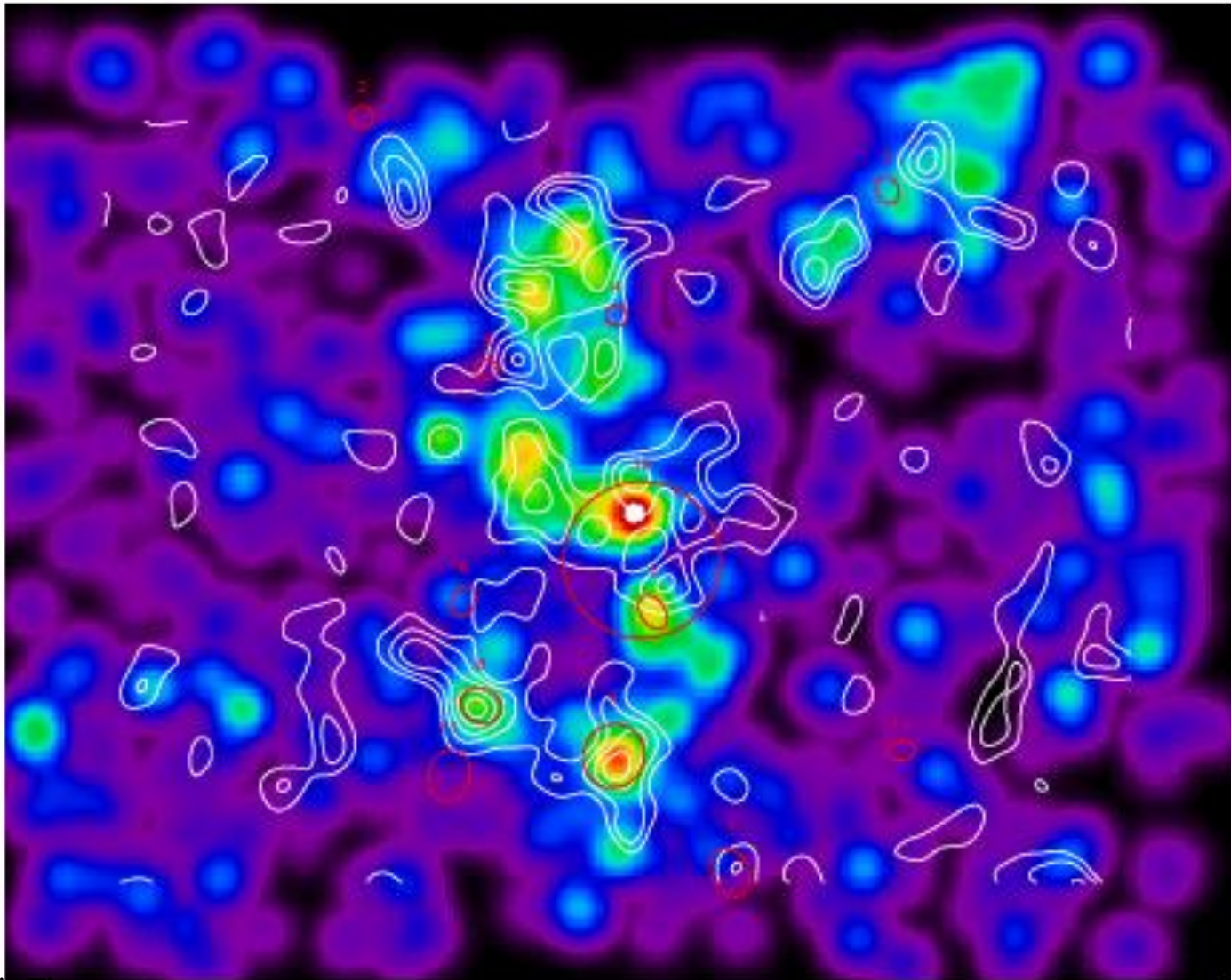
Introduction

- Gravitation lensing studies of clusters usually uses clusters found in X-ray surveys

- The best studied range of [M,z] slowly becomes too boring.

- Very little experience is there in doing $1.e14$ solar mass clusters, may not seem that exciting for TACs.

- Is there an easy way to progress?

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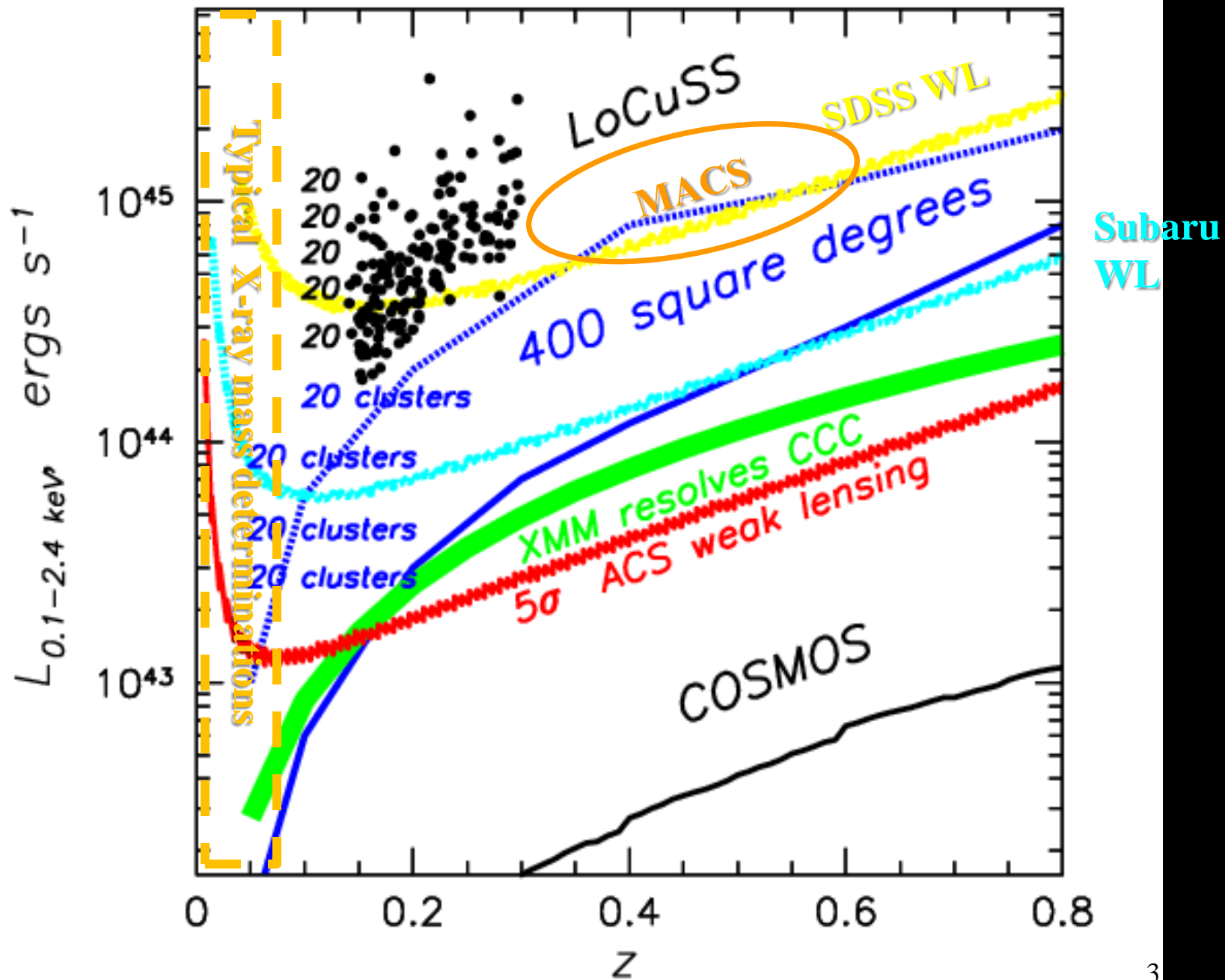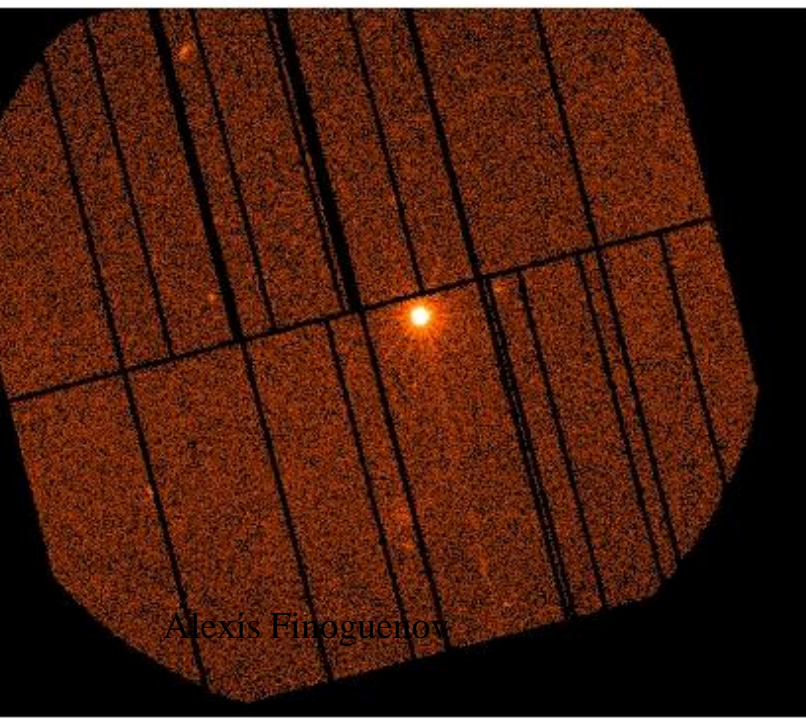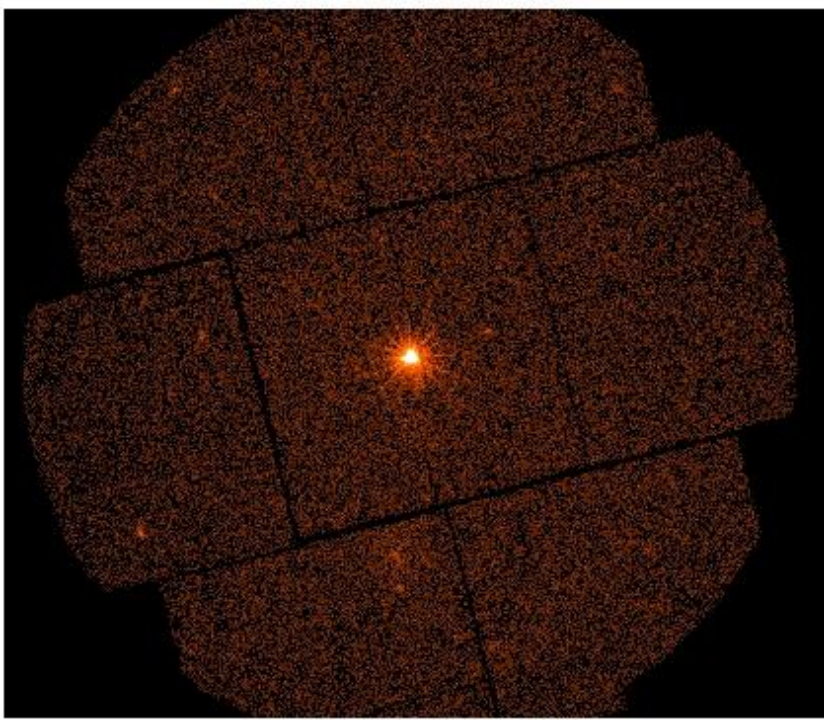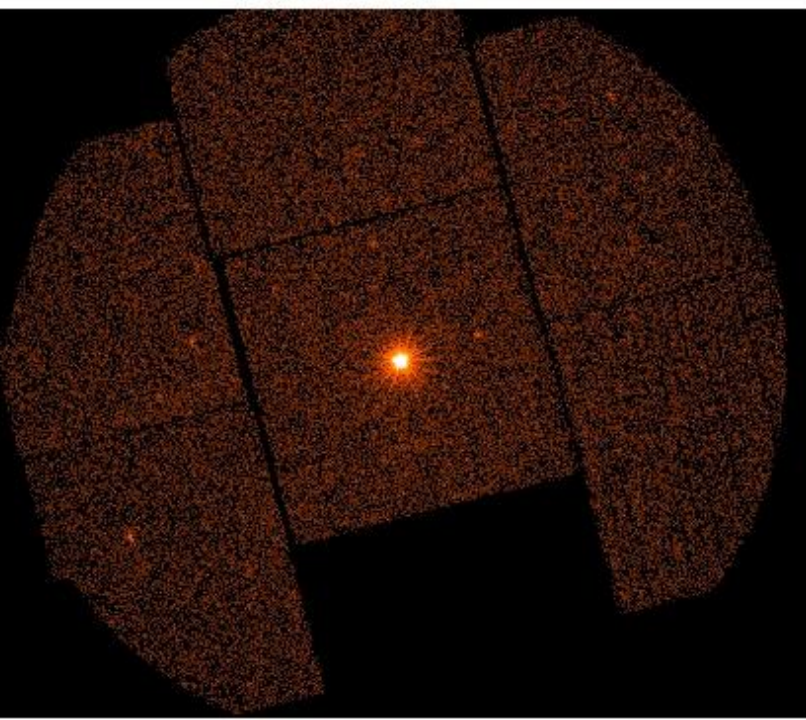
A689 or how it all has started…

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A689

Motivation for using WL surveys: I

- RASS yields 1 cluster in 10 square degree, 1 massive cluster in 100 square degrees

- Next to it sample is 400 sq.degs with 1 cluster per square degree

- ACS finds 10 clusters per square degree, ground-based searches using Subaru and CFHT yield upto 3 clusters per square degree: not bad at all
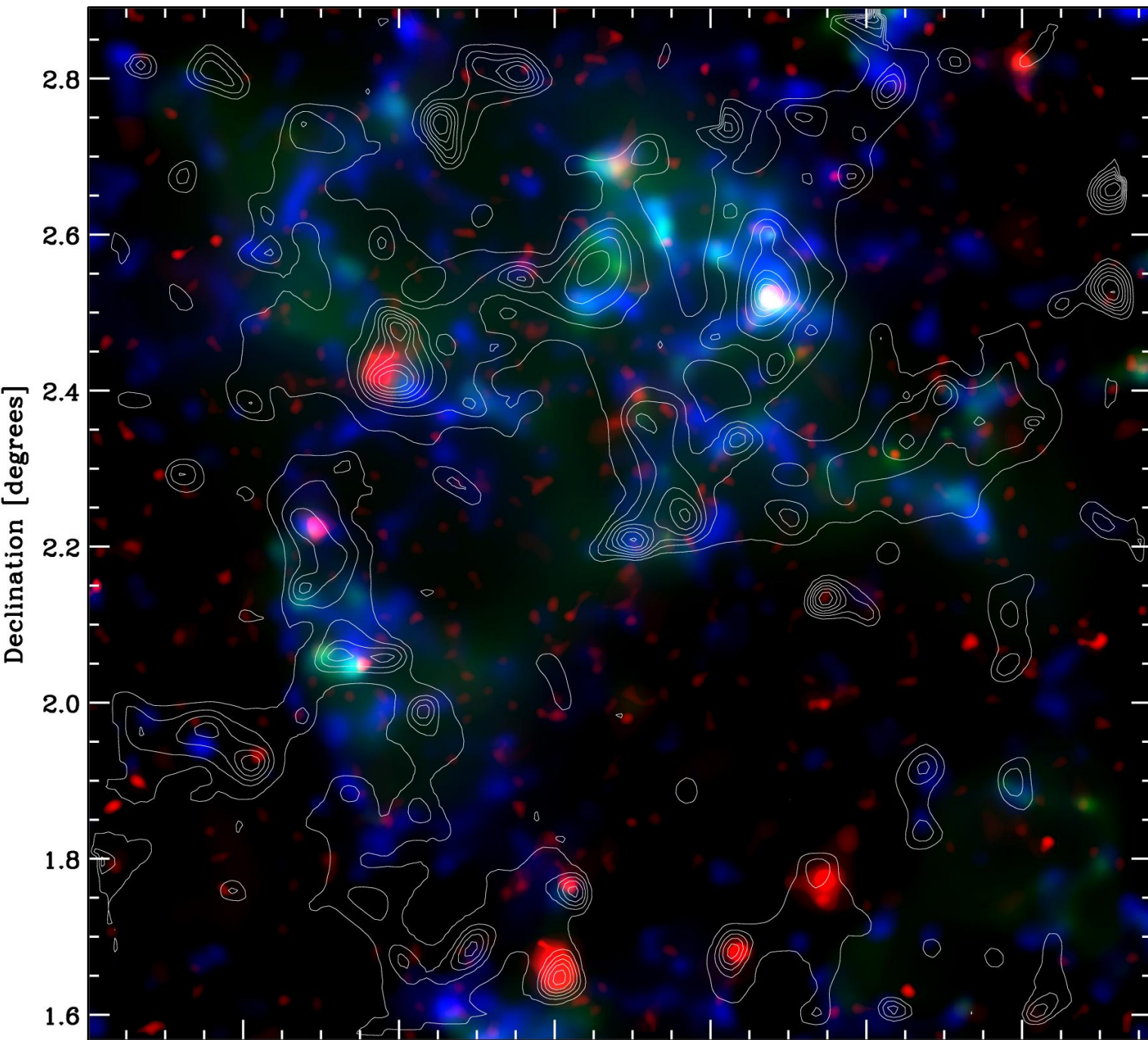
C
O
S
M
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S

**Massey
et al.
2007**

Scatter in prediction vs detection is around 30%

$Z_{bg}=1.5$

Ja
et

Motivation for using surveys: II
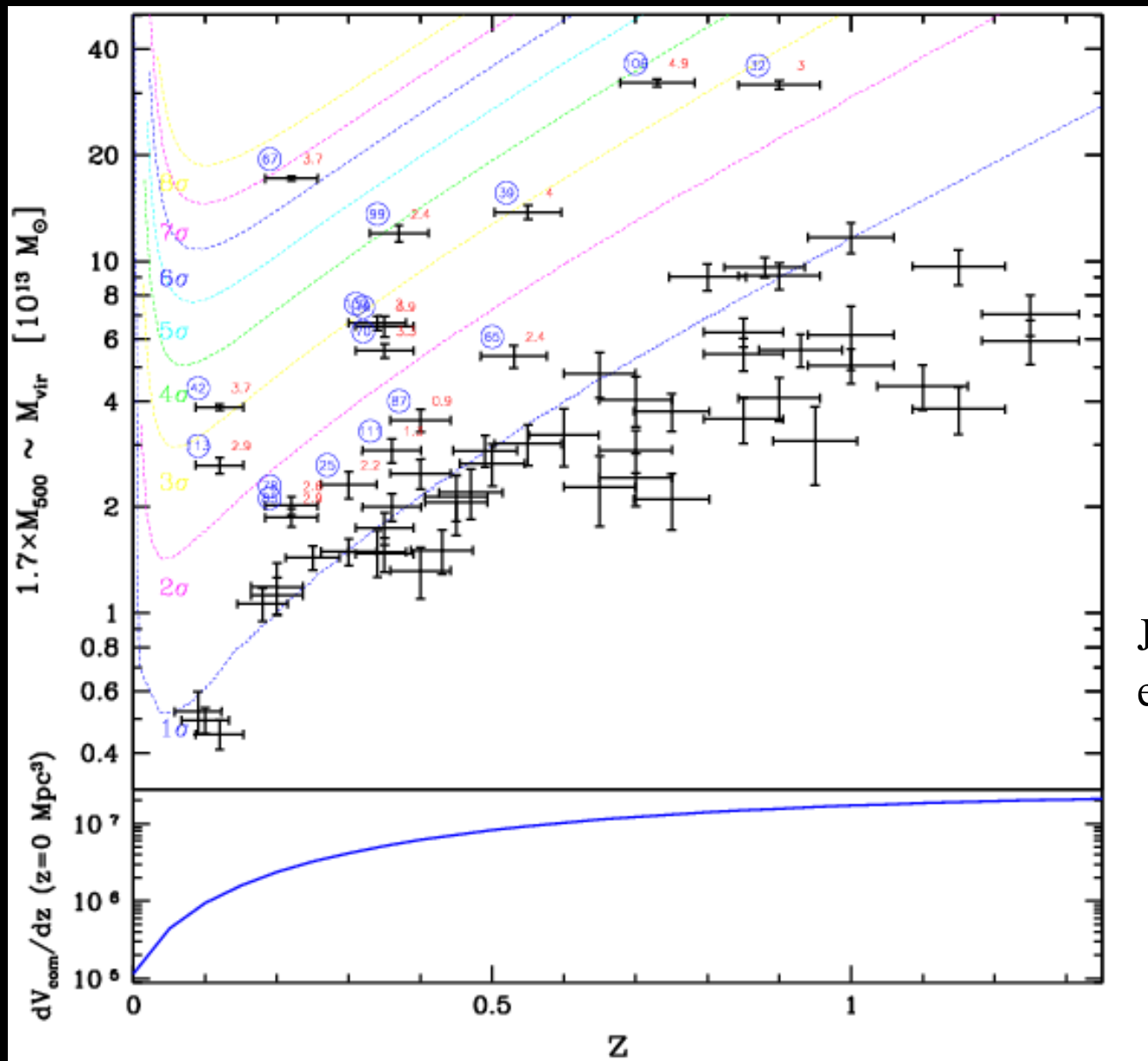
- Multiband imaging exist, not only <z> but a proper shear-to-dSigma conversion is possible: higher signal

- In case of XMM surveys, enough counts are there to go for Yx, plus to understand the contamination if present, PSF is not an issue to get Yx

- If systematical scatter in WL is 30%, no need to go for better statistics on individual objects

- XMM cluster catalogs go much deeper and allow for a detailed modeling of WL detection

Subaru fields

TABLE 1
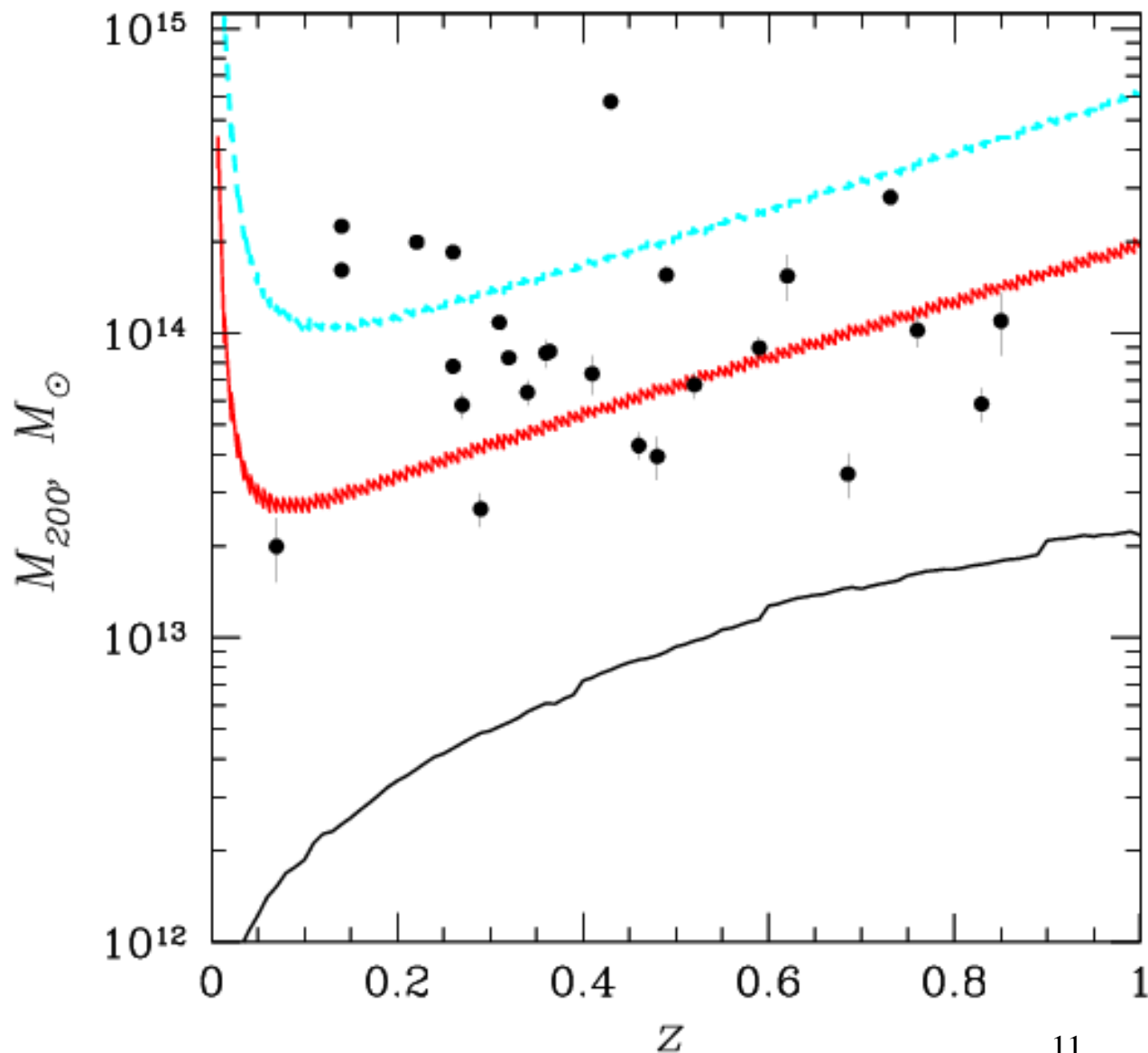
SUPRIME-CAM WEAK LENSING SURVEY FIELDS.

Field	RA	DEC	Area[a] deg^2	Secure Area[b] deg^2	Seeing[c] arcsec	ρ_{gal}[d] arcmin^2	T_R[e] ksec	T_C[e] ksec	T_N[e] ksec
DEEP02	02:30	00	1.39	0.73	0.70 ± 0.06	33.5 ± 6.1			
SXDS	02:18	−05	1.12	0.83	0.68 ± 0.06	47.7 ± 5.7			100
XMM-LSS	02:26	−04	2.80	2.24	0.55 ± 0.07	46.0 ± 6.7			10
Lynx	08:49	+45	1.76	1.28	0.80 ± 0.08	30.7 ± 7.3	64	300	140
COSMOS	10:02	+01	1.92	1.41	0.54 ± 0.03	37.1 ± 2.1			30
Lockman Hole	10:52	+57	1.85	1.57	0.60 ± 0.14	39.3 ± 7.8	200	300	100
GD140	11:36	+30	1.83	1.50	0.71 ± 0.17	29.3 ± 12.9	33		
PG1159-035	12:04	−04	1.43	1.19	0.75 ± 0.05	23.4 ± 3.6	51		
13 hr Field	13:34	+38	2.06	1.72	0.74 ± 0.17	29.6 ± 9.6	110	120	130
GTO2deg^2	16:04	+43	2.01	1.53	0.67 ± 0.04	38.0 ± 3.6	26		
CM DRA	16:34	+57	1.38	0.99	0.72 ± 0.12	28.4 ± 8.4	47		
DEEP16	16:52	+36	1.20	0.93	0.76 ± 0.08	26.4 ± 4.0			
DEEP23	23:30	00	1.07	0.80	0.58 ± 0.01	36.3 ± 1.3			
Total			21.82	16.72					

Subaru sample

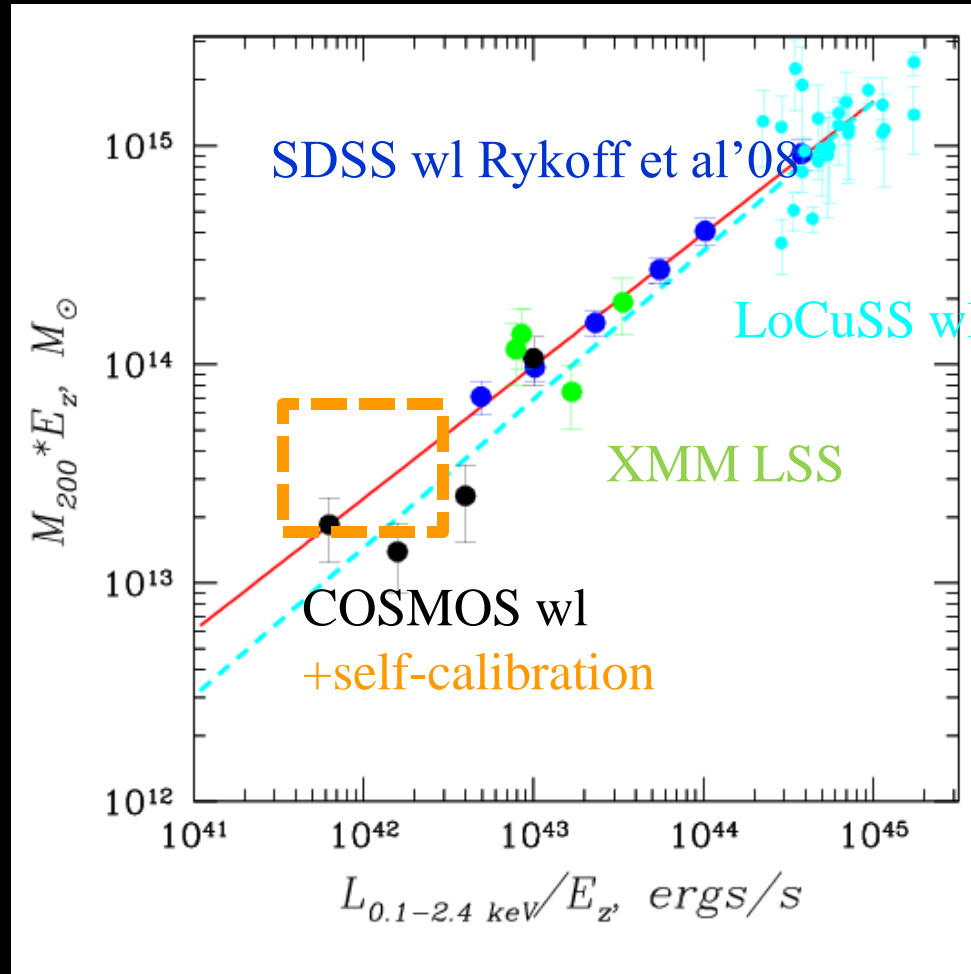Subaru: 20 sq.degs. XMM: 6 sq.degs.

500 clusters detected with XMM.

40 matches with WL (not everything is plotted, sorry!) X-ray mass estimates are plotted
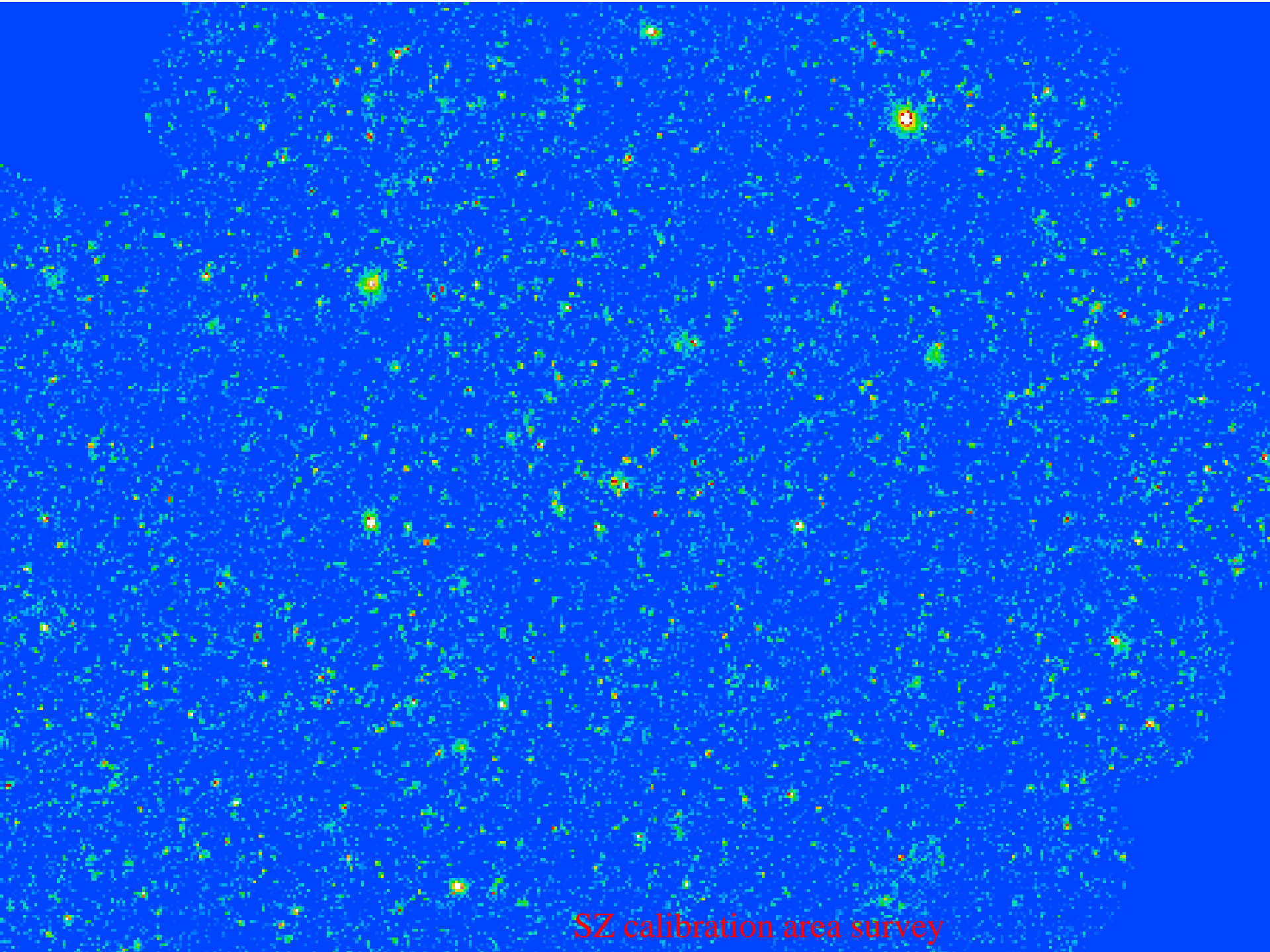
CFHT legacy survey

L$_x$-M relation

SDSS wl Rykoff et al'08

LoCuSS wl

XMM LSS

COSMOS wl

+self-calibration

$M_{200}*E_z$, $M_\odot$

$L_{0.1-2.4\ keV}/E_z$, ergs/s

CFHT
15 WL selected
clusters
(**Lerchster**).
4 published in
Berge
et al. (Lx from
Pacaud)

Far and near future

- Sensitivity of eROSITA yields 3-10 clusters per square degree: all usable sky

- SNAP/EUCLIDE will cover 20000s sq. degrees to a similar sensitivity

- Altogether this will yield unprecedented catalogs of 100k clusters!

- It does sound that covering 100 sq.degs. of CFHT legacy survey with XMM would in the mean time be the survey to go for: 300 clusters with mass measurement, 5k clusters to stack

- Weak lensing follow-up of XMM serendipitous sources!

SZ calibration area survey