

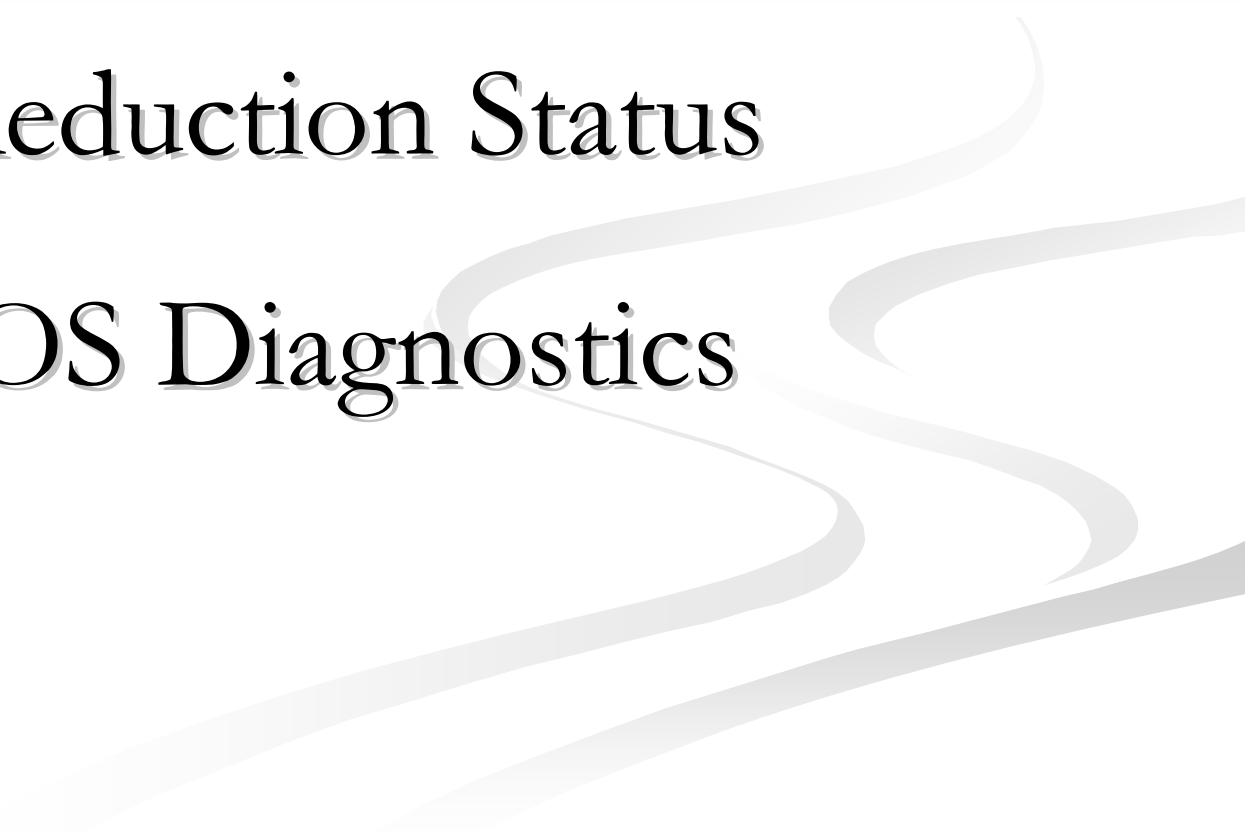
The XMM-Newton Distant Cluster Project

Rene Fassbender (MPE)

Ringberg Workshop

October 2005

Outline

- I. Introduction & Method
 - II. X-ray Reduction Status
 - III. COSMOS Diagnostics
- 

I. Introduction & Method

II. X-ray Reduction Status

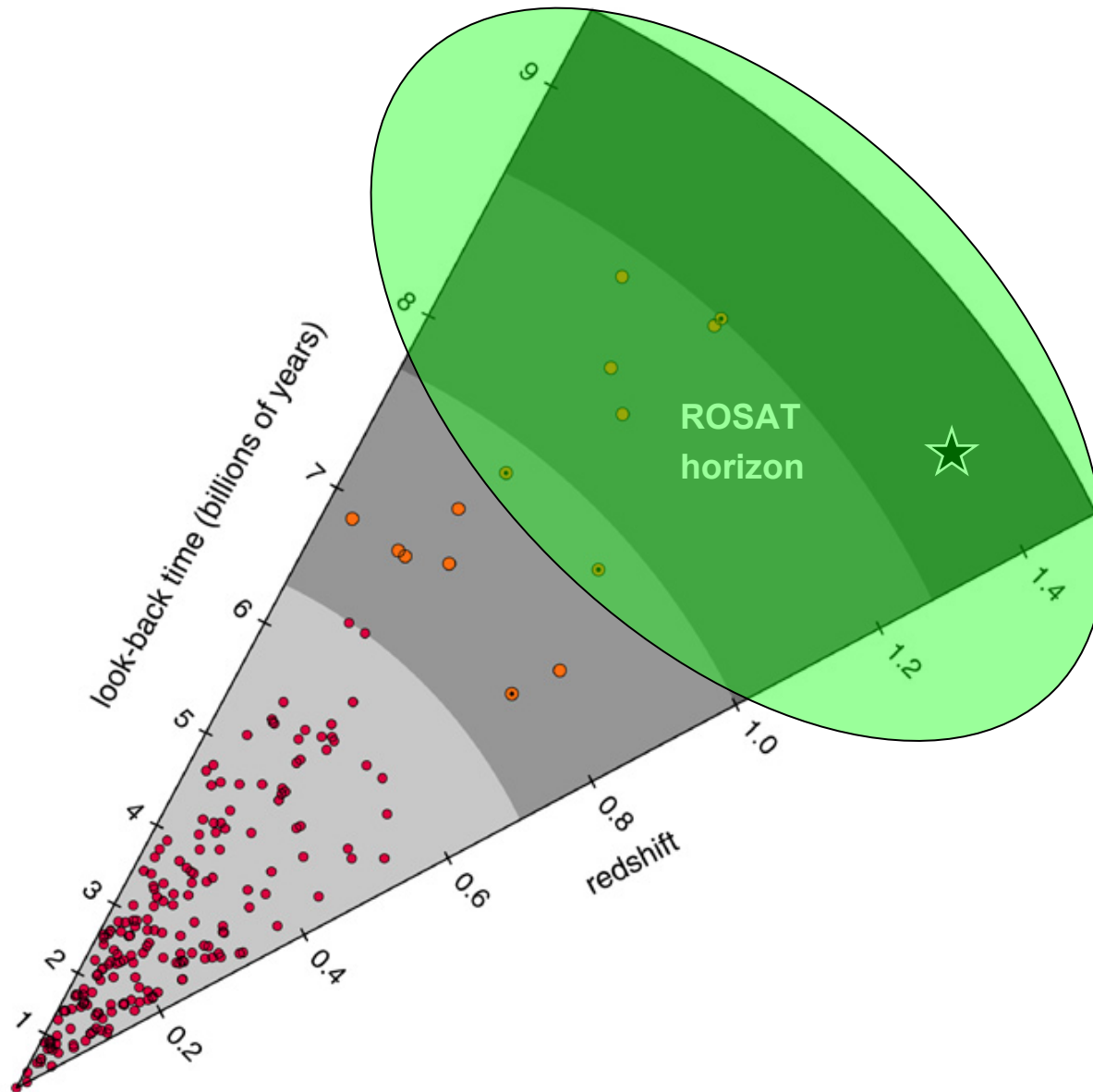
III. COSMOS Diagnostics

Science Motivation

- Study galaxy clusters and their evolution close to epoch of formation
- Obtaining high- z laboratories to trace galaxy and ICM evolution
- Study formation and evolution of large-scale structure
- Get better leverage for constraining cosmological models

Goal: Statistically significant sample of ≥ 30 $z > 1$ galaxy clusters

XDCP - Targeted Redshift Regime



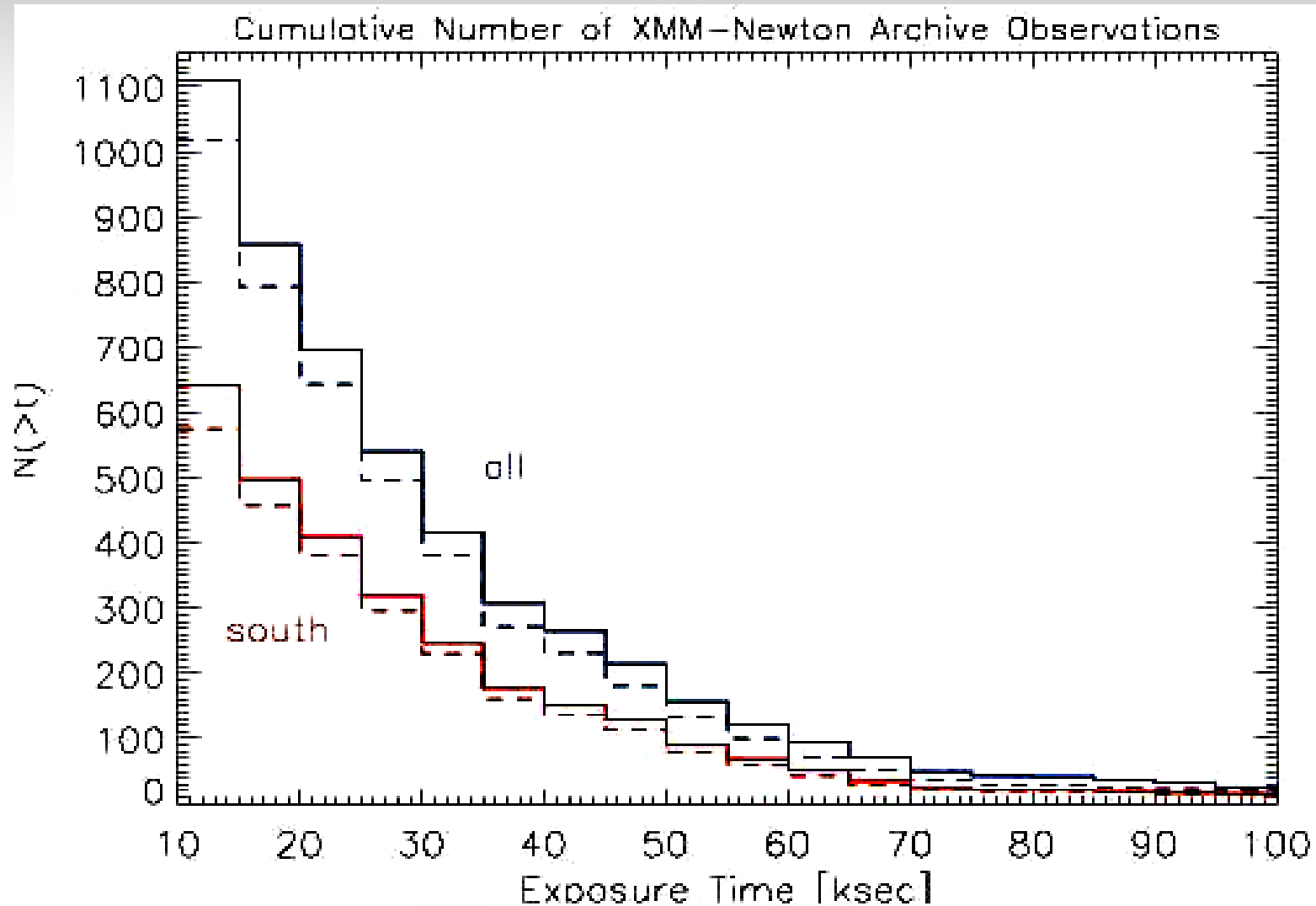
I. Introduction & Method

II. X-ray Reduction Status

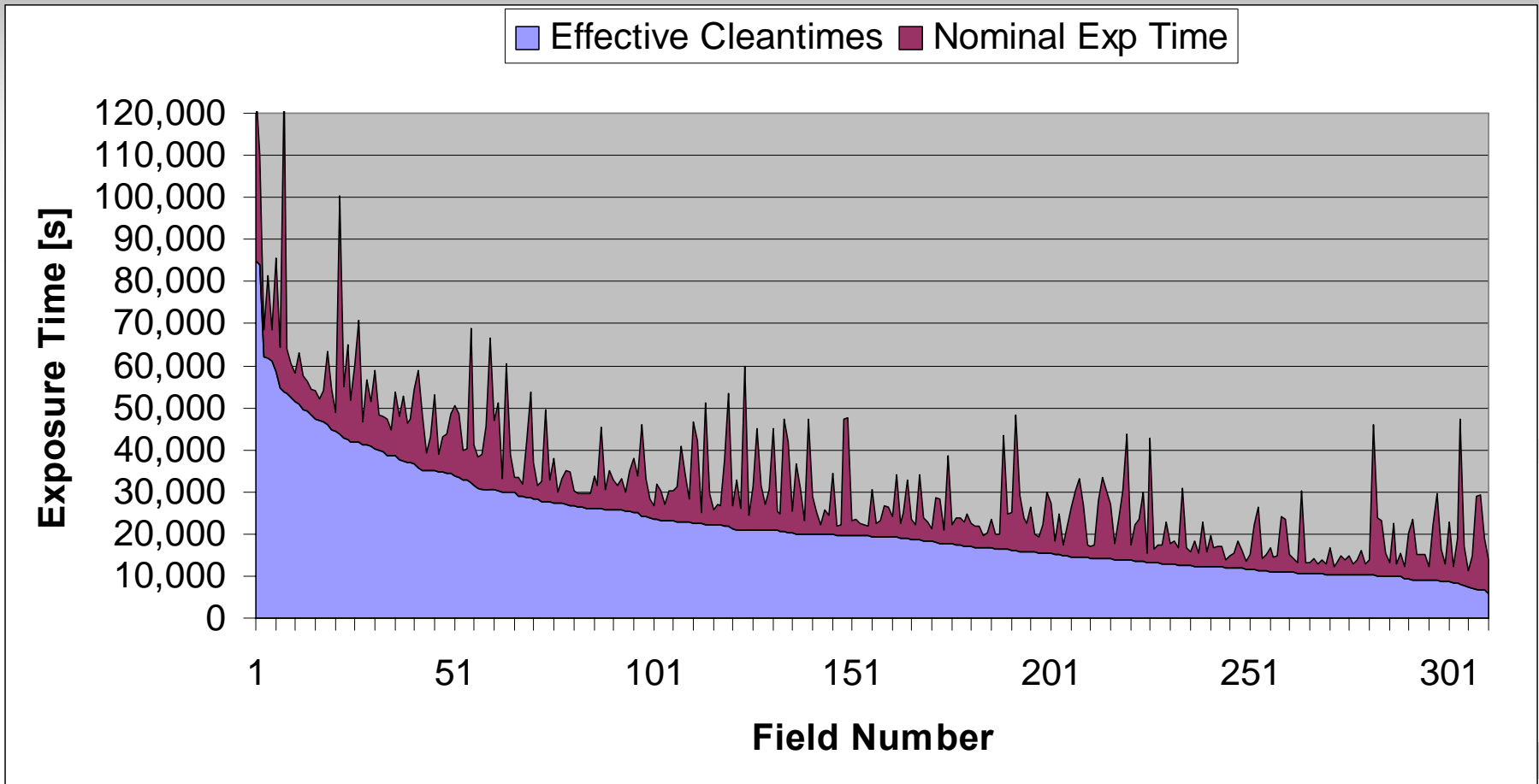
III. COSMOS Diagnostics

The XMM-Newton Data Archive

Status: November 2004



Exposure Times of first 310 Fields



Average Nominal Exptime: 32.2 ksec

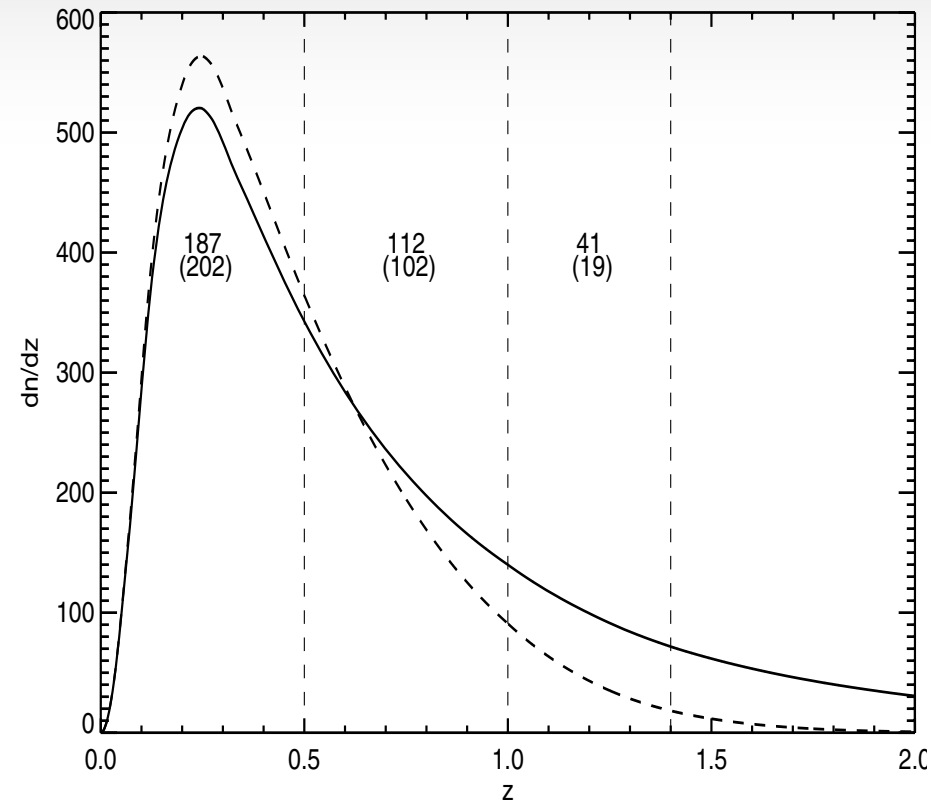
Average Cleantime: 22.1 ksec

Good Time Fraction: 70%

Total Nominal Exptime: 10.0 Msec

Total Cleantime: 6.87 Msec

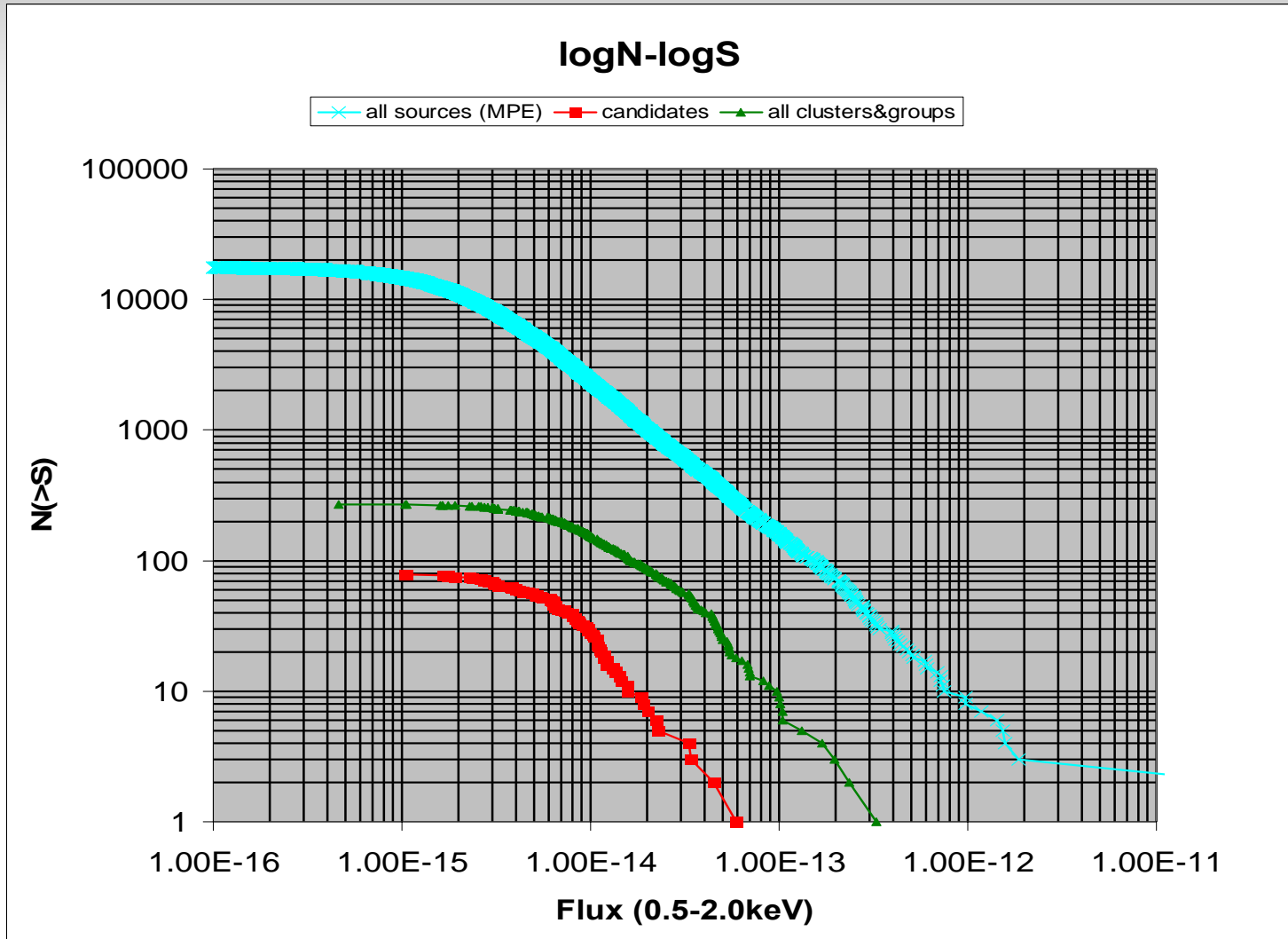
One $z \geq 1$ cluster is expected per deg^2



8 candidates per deg^2 :

- 1 cluster at $z \geq 1$
- 1.5 clusters at $0.8 \leq z < 1$
- 3.5 clusters at $0.5 \leq z < 0.8$
- 2 spurious sources
- clusters at $z < 0.5$ visible on DSS

Source Detection Results of first 122 Fields



XDCP Pipe: Data Reduction

ODF cat

XDCP_PIPE

cifbuild, odfindgest, chains
general setup

hard band flare removal
+ soft band cleaning, stats

OoT correction, images for
different bands, PN+MOS
combination

Gaussian smoothing

PREPAR A,B,C

Cleaning 1+2

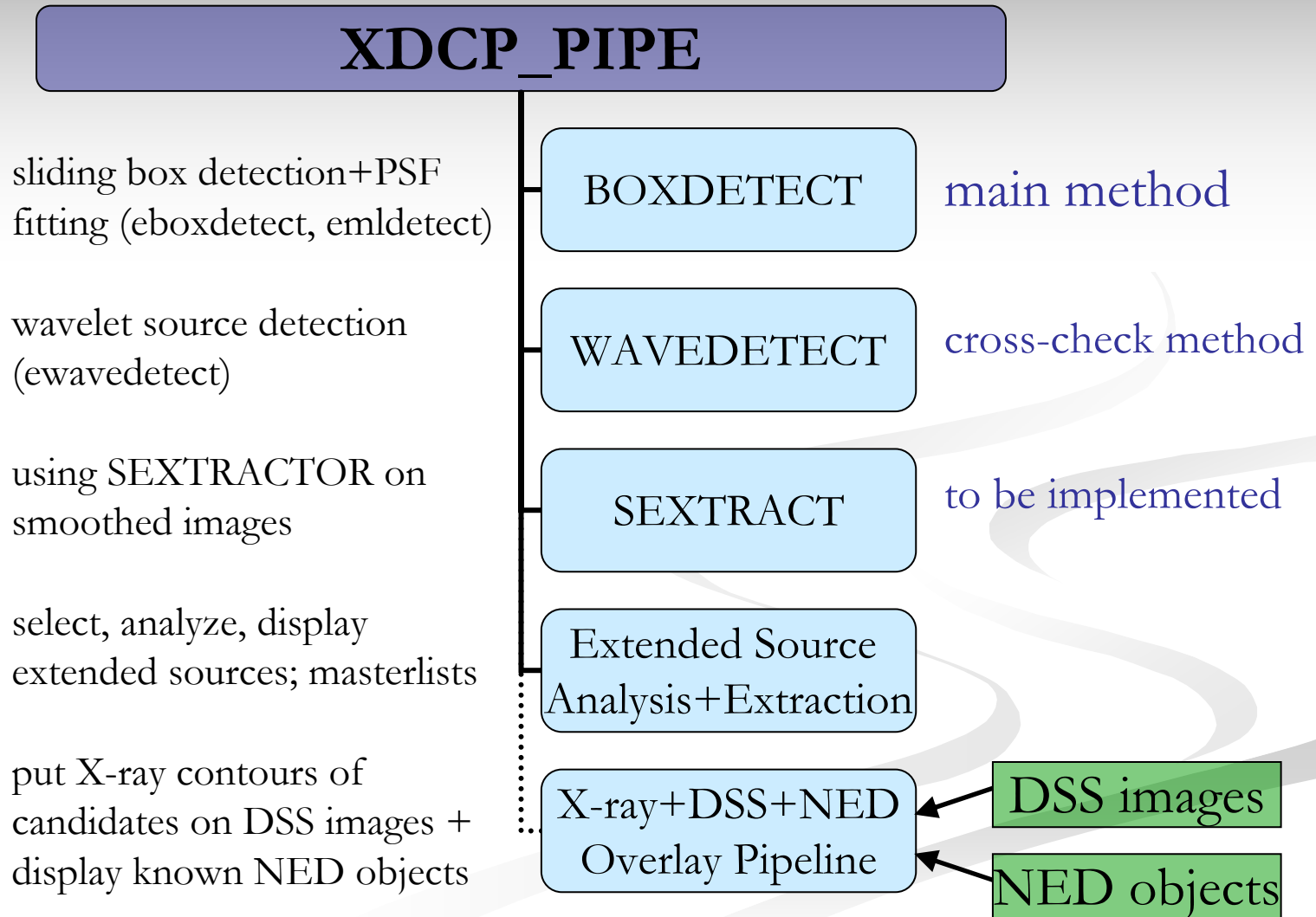
Images
Creation + Combination

Image Smoothing

Source Detection

based on HxB reduction pipeline

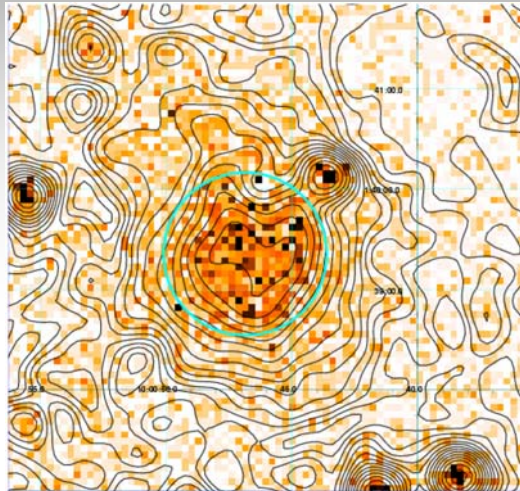
XDCP Pipe: Source Detection



Extended Source Screening (1)

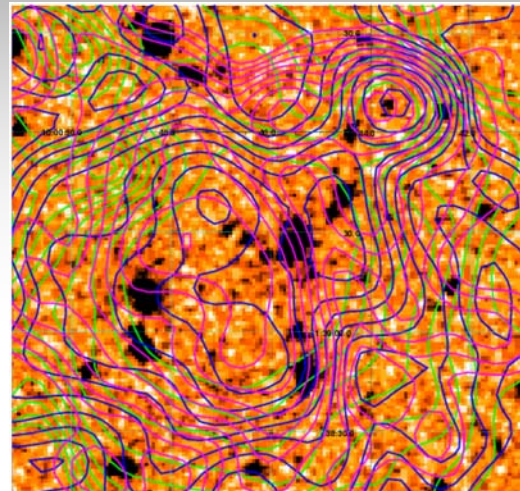
a) X-ray data

circle = core radius



5 x 5 arcmin

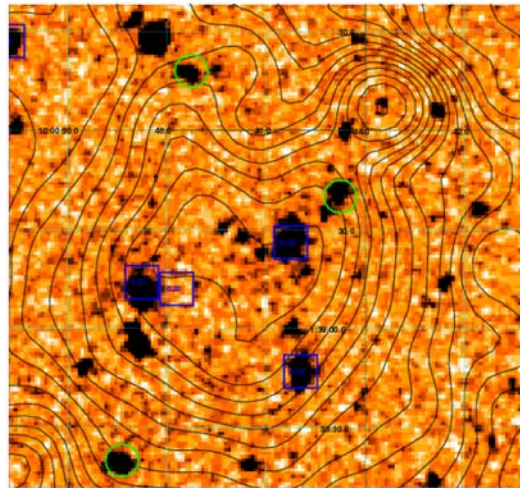
b) Individual
Detector Contours



2.5 x 2.5 arcmin

c) DSS_red-
Xray Overlay

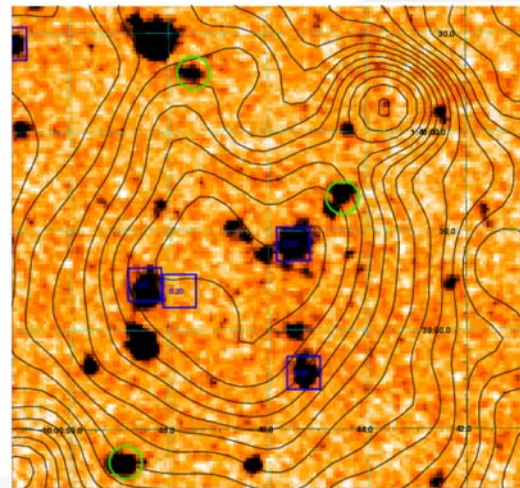
boxes = NED obj



2.5 x 2.5 arcmin

d) DSS_IR-
Xray Overlay

boxes = NED obj

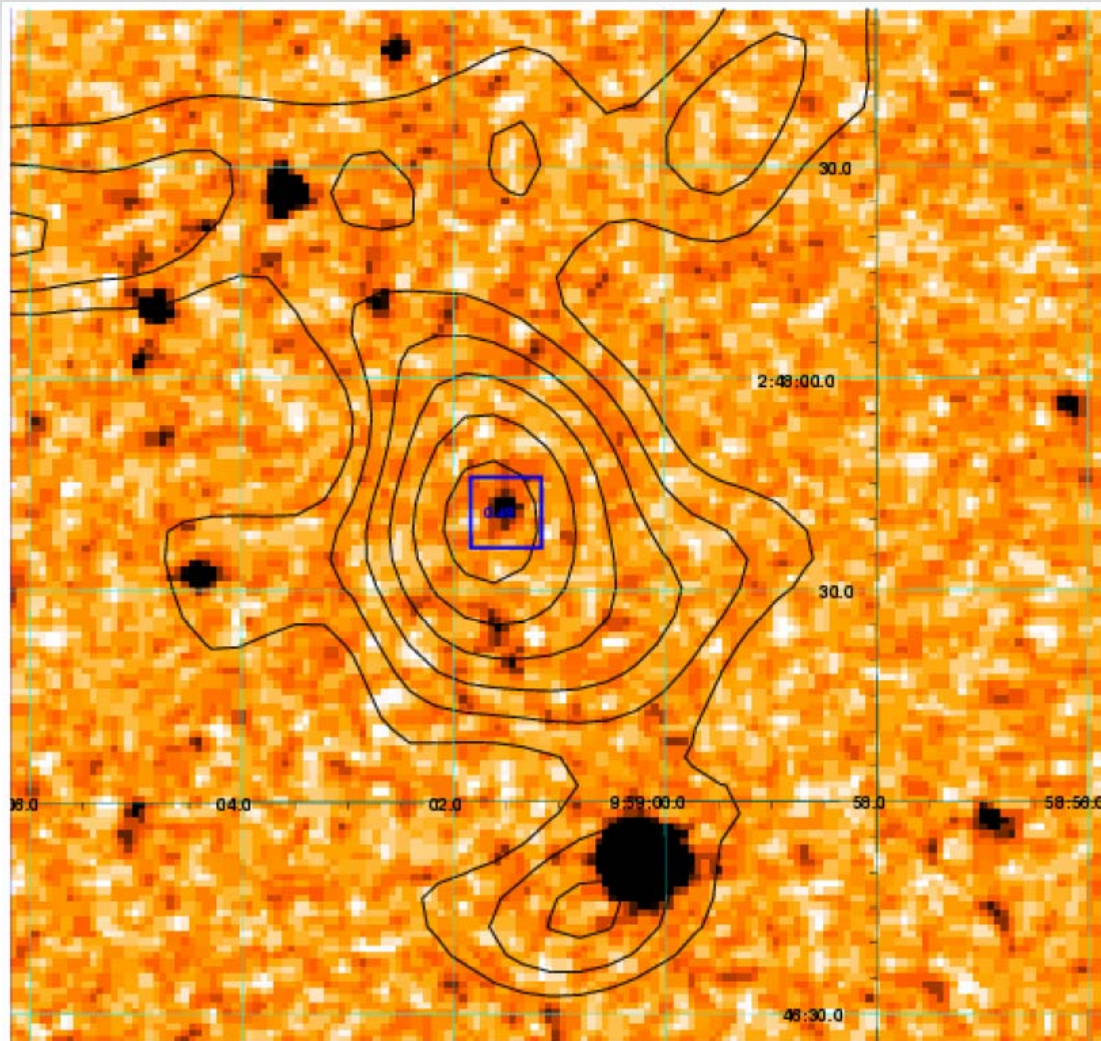


2.5 x 2.5 arcmin

Galaxy cluster at $z=0.22$

Extended Source Screening (2)

DSS limit at $z \sim 0.5$



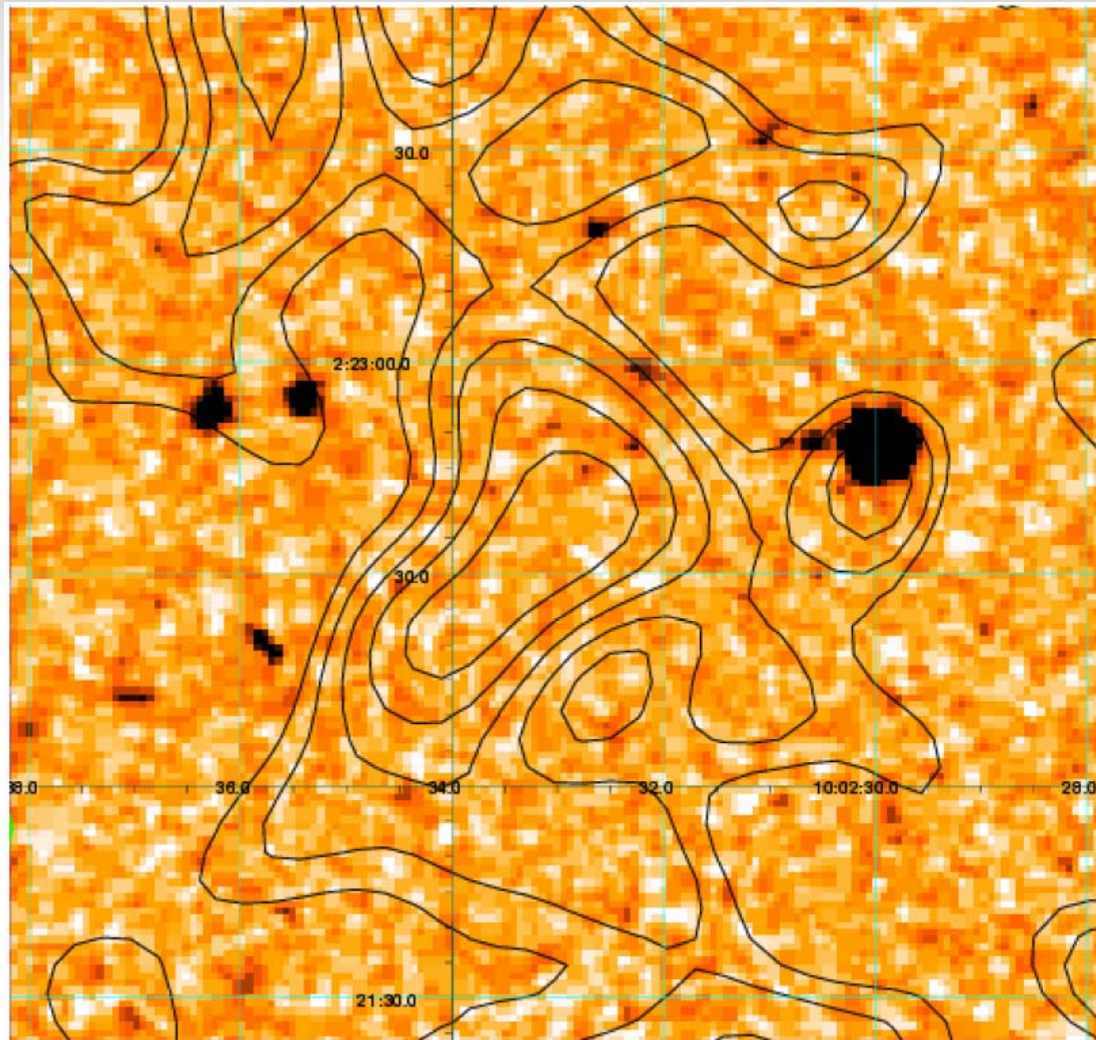
Galaxy cluster
at $z=0.49$

DSS_red-Xray Overlay

2.5 x 2.5 arcmin

Extended Source Screening (3)

Distant cluster candidate beyond DSS limit

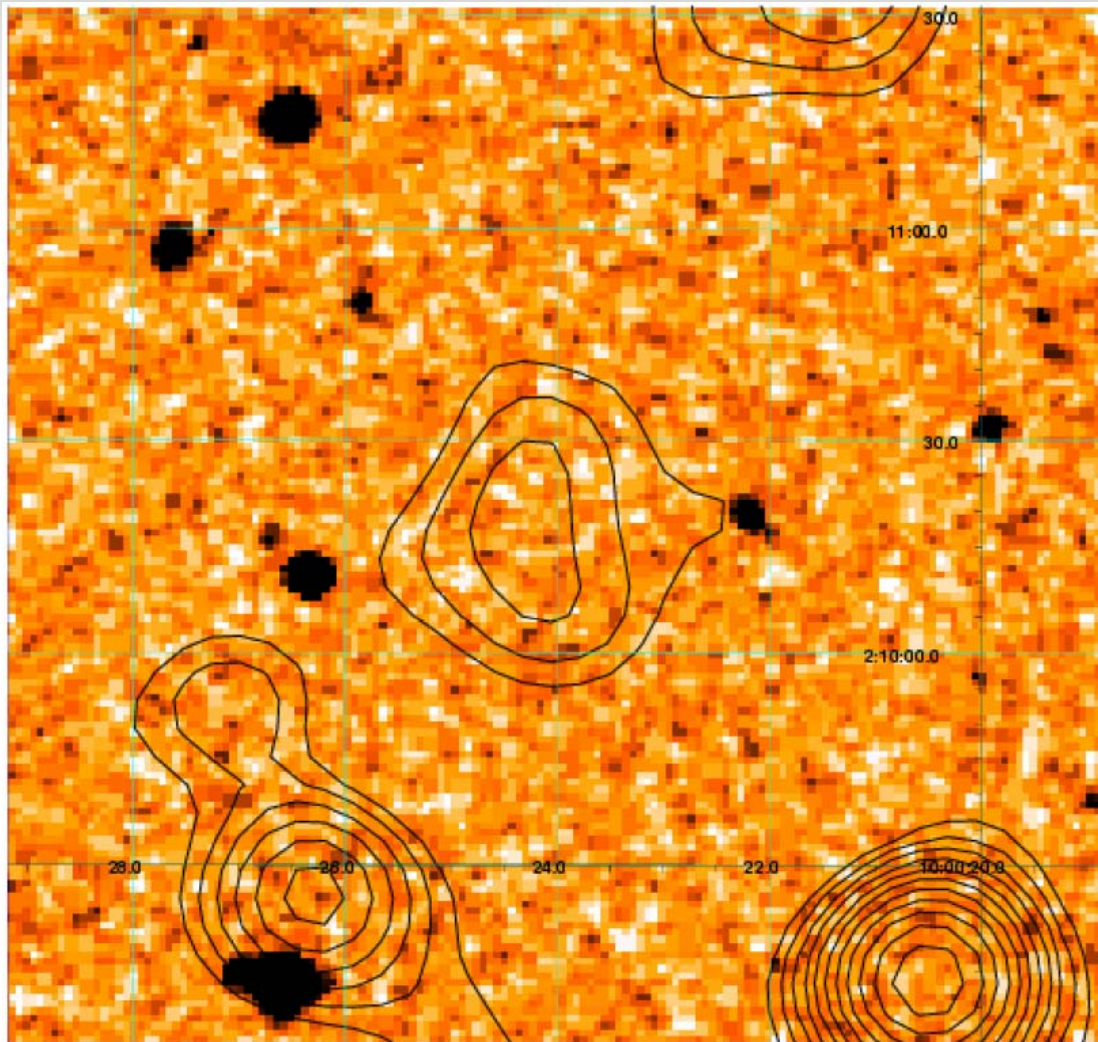


DSS_red-Xray Overlay

2.5 x 2.5 arcmin

Extended Source Screening (4)

Good distant cluster candidate

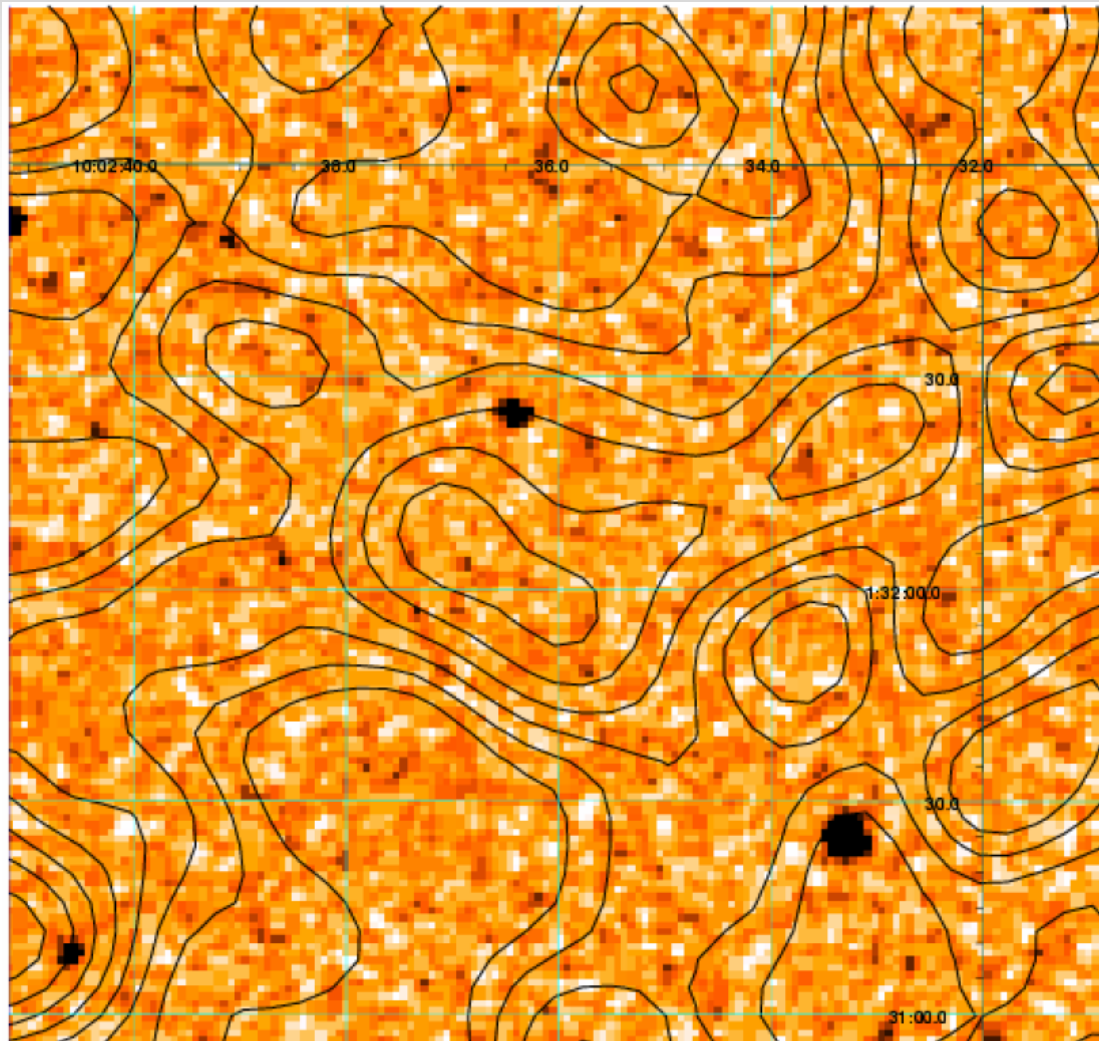


DSS_red-Xray Overlay

2.5 x 2.5 arcmin

Extended Source Screening (5)

Distant cluster candidate at detection limit



DSS_red-Xray Overlay

2.5 x 2.5 arcmin

I. Introduction & Method

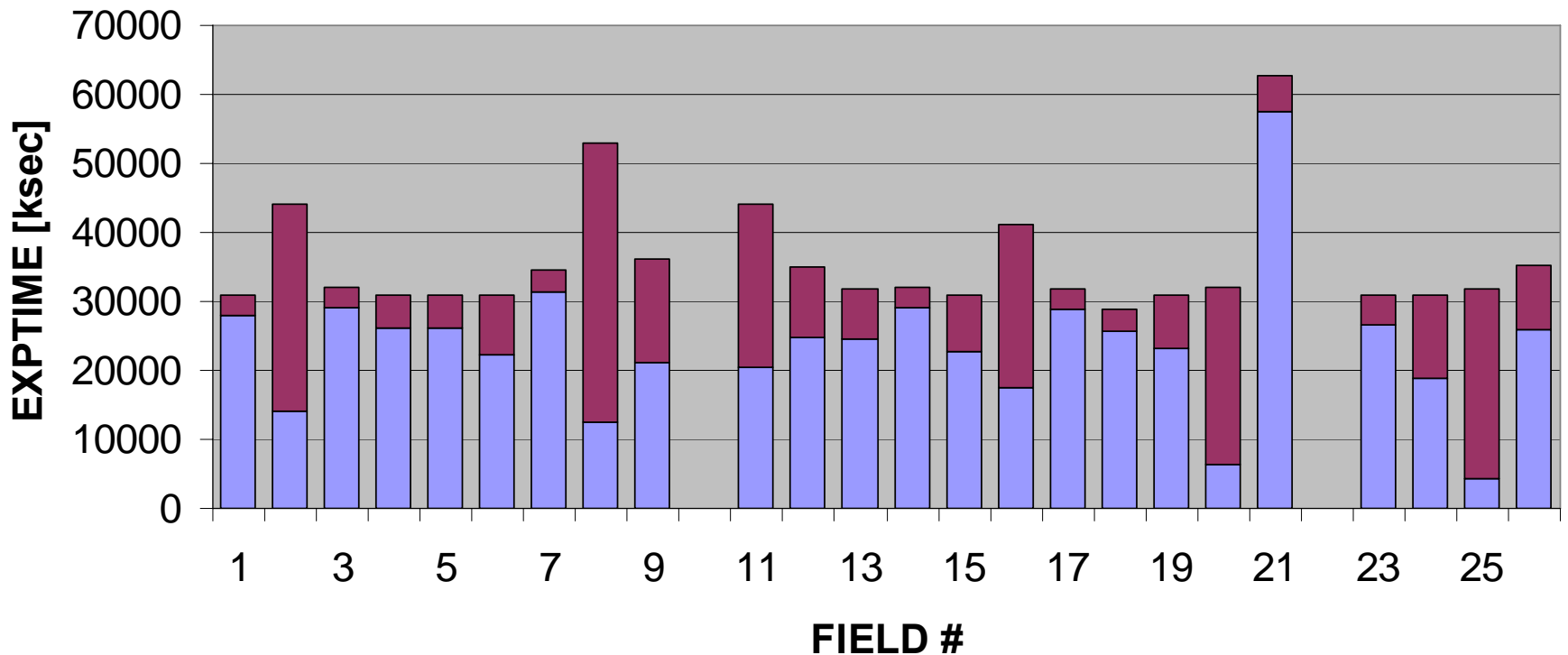
II. X-ray Reduction Status

III. COSMOS Diagnostics

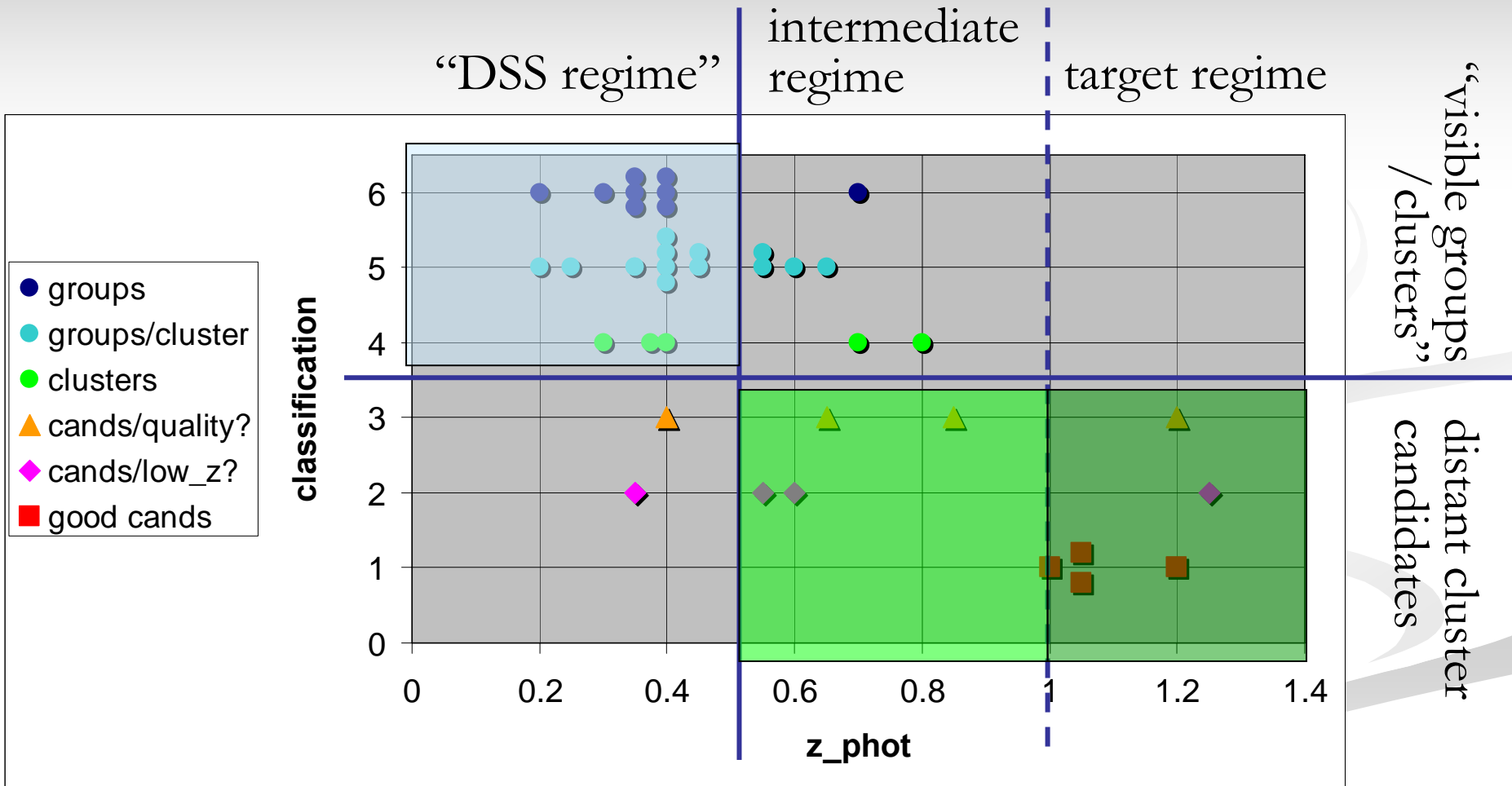
COSMOS – The most expensive “calibration data” ever taken

COSMOS CLEAN TIME

■ CLEAN TIMES ■ NOMINAL EXPTIMES

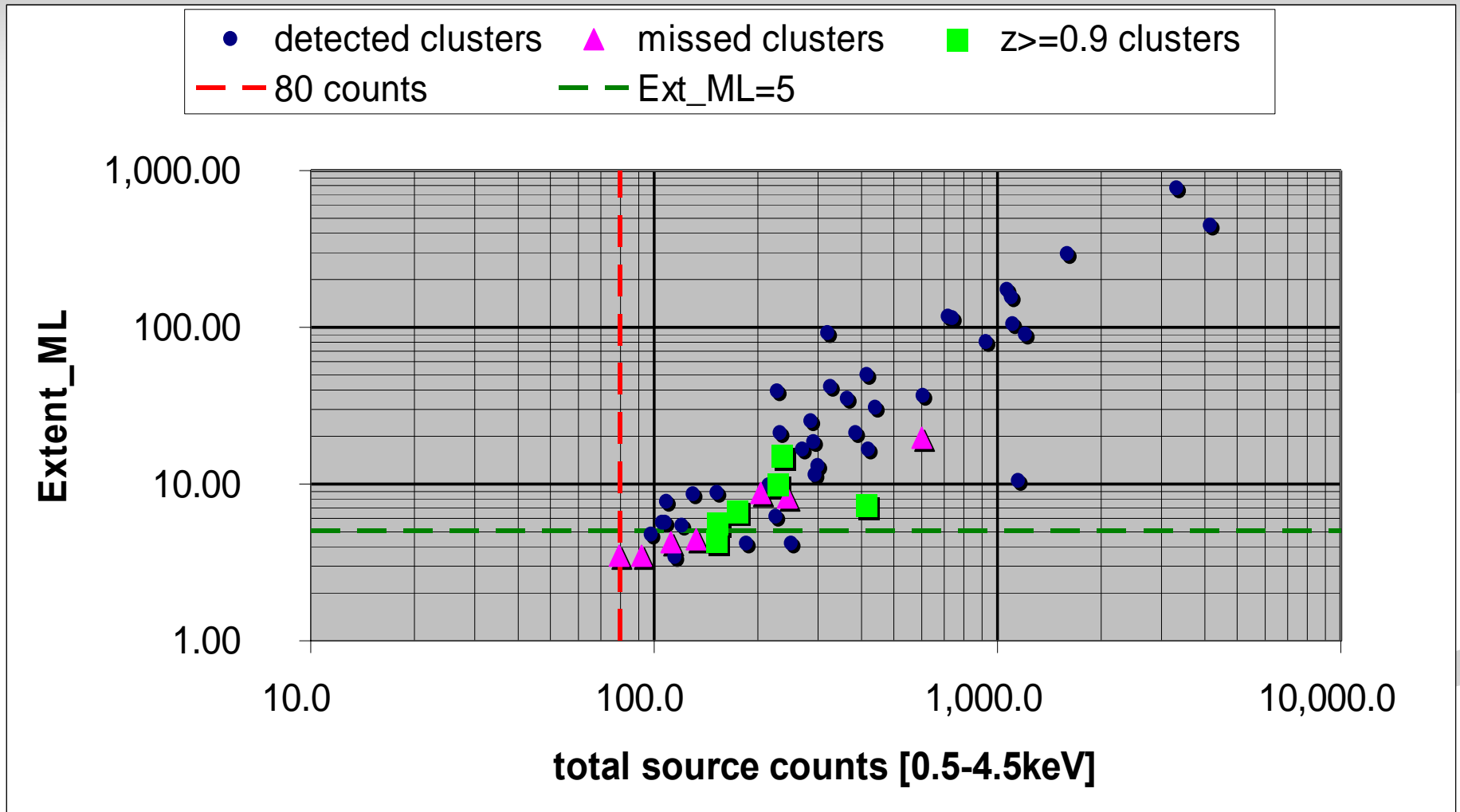


Identified clusters & groups in the COSMOS field



Identified COSMOS clusters & groups

Extent_ML vs Counts



Summary & Outlook

- X-ray data reduction & source detection for the ~ 30 deg² XDCP Southern Survey will be finalized within the next few months
- “COSMOS diagnostics” shows that the screening and distant cluster candidate selection work well
- The XDCP is ready for a large photometric & spectroscopic optical follow-up program to confirm ~ 30 $z > 1$ galaxy clusters