

# CWG Splinter Summary and Status Update

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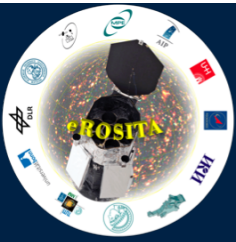
# Splinter Talks (17x)

- A. Finoguenov (MPE) [eROSITA cluster selection function.](#)
- D. Eckert (MPE) [Measuring Mgas and core-excised Lx in survey data](#)
- S. Grandis (LMU) [Number counts with RASS-DES](#)
- J. Ider Chitham (MPE) Optical galaxy cluster identification with PS1 and CODEX
- N. Clerc (IRAP) [SPIDERS update](#)
- G. Erfanianfar (MPE) [DECaLS Red Sequence](#)
- J. Comparat (MPE) [Joint Cluster and AGN Simulations](#)
- M. Klein (MPE/LMU): [The MCMF confirmed 2RXS cluster catalog over the full DES survey](#)
- Maria Paulus (LMU) [Studying cluster scaling relations with RASS and DES weak lensing](#)
- S. Bocquet (LMU) [Cluster-Cosmo Pipeline requirements](#)



# Splinter Talks (cont)

- T. Schrabback (AIFA) VLT weak lensing data sets for the high- $z$  mass calibration
- Romy Rehm (LMU) WL mass determinations of Xray & SZ clusters with the Wendelstein 2m
- Jeremy Sanders (MPE) [eROSITA thermodynamic profiles of SPT clusters](#)
- W. Xu (AIFA) [A New X-ray Selected Sample of Very Extended Galaxy Groups from RASS](#)
- A. Pérez (AIFA) [eROSITA simulations of extended clusters](#)
- K. Migkas (AIFA) [L-T anisotropy study with eeHIFLUGCS](#)
- M. Costanzi (LMU) ["Modeling of the redMaPPer DES selection function"](#)



# Topics

- Cluster selection
- eROSITA cluster mocks
- Mass proxy measurements
- Mass calibration
- Photometric and Spectroscopic followup
- Cosmology Pipeline Requirements/Tests
- Studies of nearby clusters and isotropy





# Cluster Selection

- Clusters selected through X-ray signature
  - eROSITA count rate, cgs flux, detection significance, etc
- Lx-mass-z relation is key for modeling selection
  - It has higher scatter ( $\sim 30\text{-}40\%$ ) than, for example the SPT SZE-mass-z relation ( $\sim 20\%$ )
- At fixed mass-z the Lx is correlated with morphology: cool core clusters are more luminous
  - Established for 20+ years

- Key question: cluster selection

From Mohr & Evrard 1997:

## An X-ray Size-Temperature Relation for Clusters

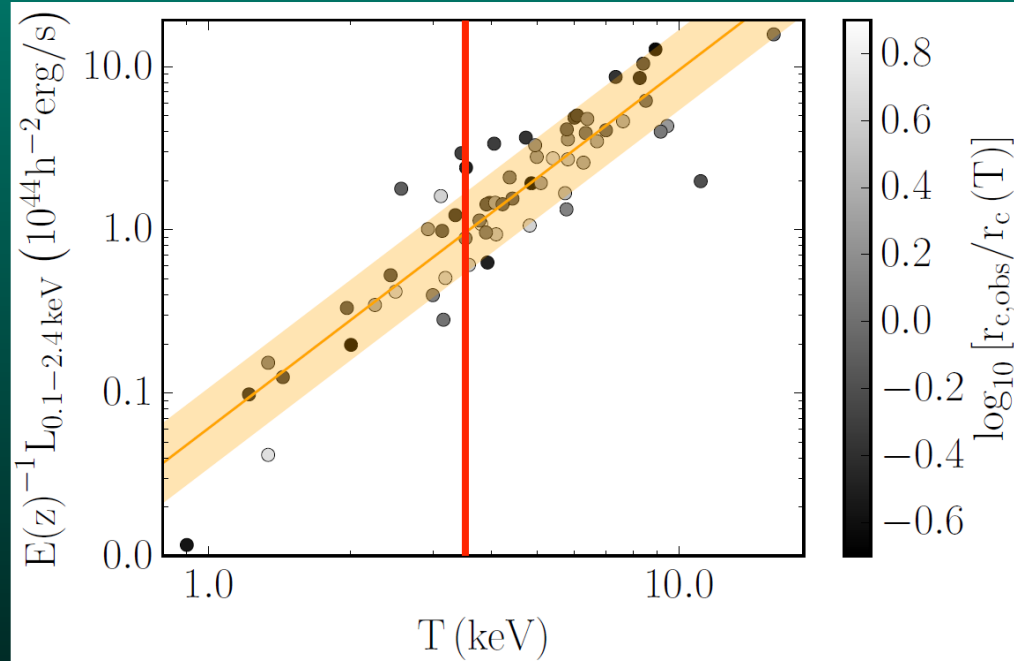
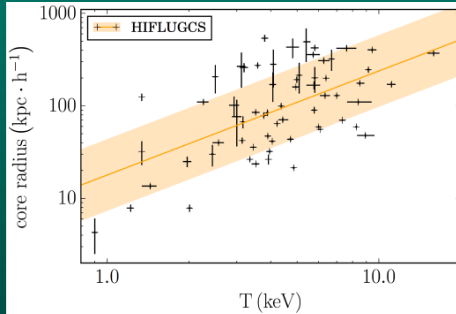
provides an alternative means of testing cluster regularity. The well known X-ray luminosity-temperature ( $L_x - \langle T_x \rangle$ ) relation (see, e.g., Smith, Mushotzky, & Serlemitsos 1979; Mitchell et al. 1979; David et al. 1993; Mushotzky & Scharf 1997) is one observational indicator of cluster regularity, but the scatter around the relation is quite large. The scatter is largely caused by varying degrees of excess core emission associated with cooling flows (Fabian et al. 1994).

to improve models of



# Multi-scale Cluster Selection

## Scaling relations - Covariance



• **Covariance:**

$$\rho_{r,L} = -0.46^{+0.01}_{-0.03}$$

$$\rho_{\beta,L} = 0.24^{+0.02}_{-0.07}$$

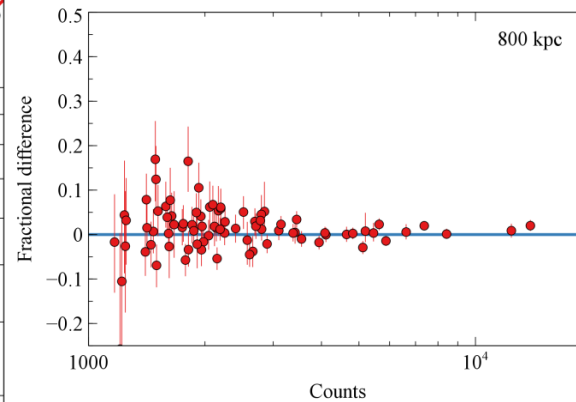
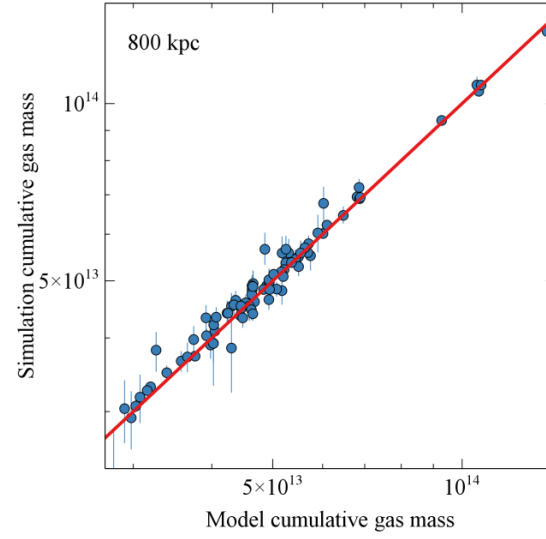
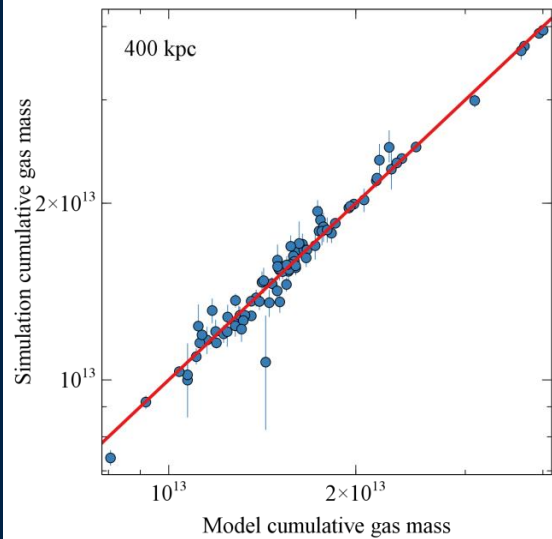
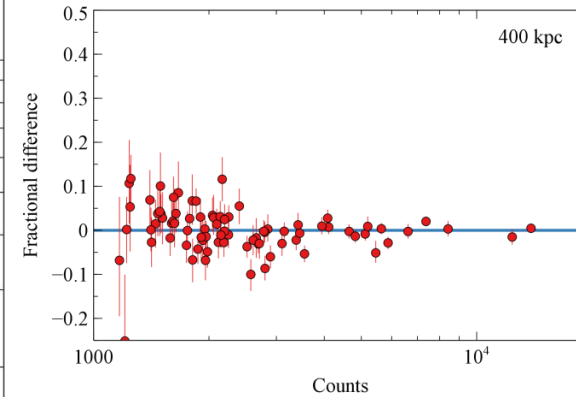
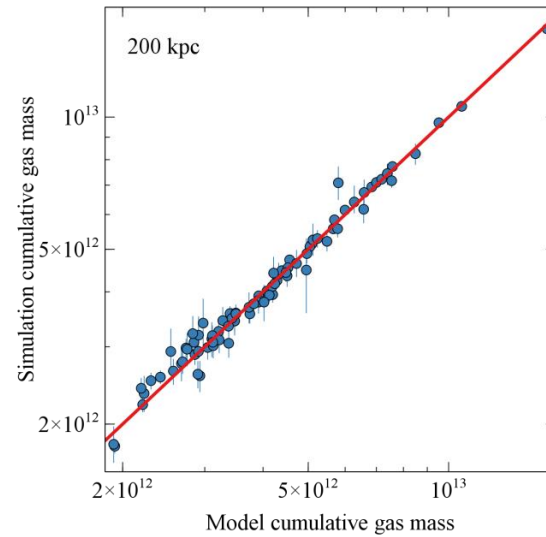
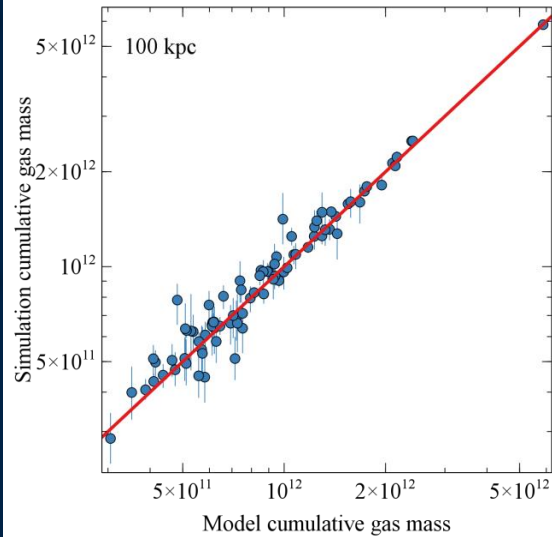
$$\rho_{r,\beta} = 0.73^{+0.03}_{-0.13}$$







# Cumulative gas mass as fn of radius J. Sanders



Counts includes background (1013 cts)



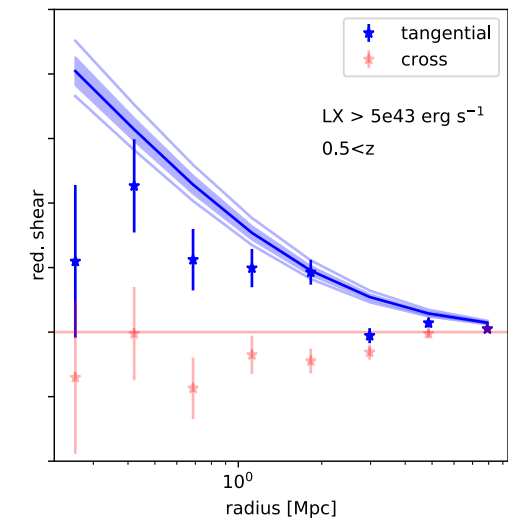
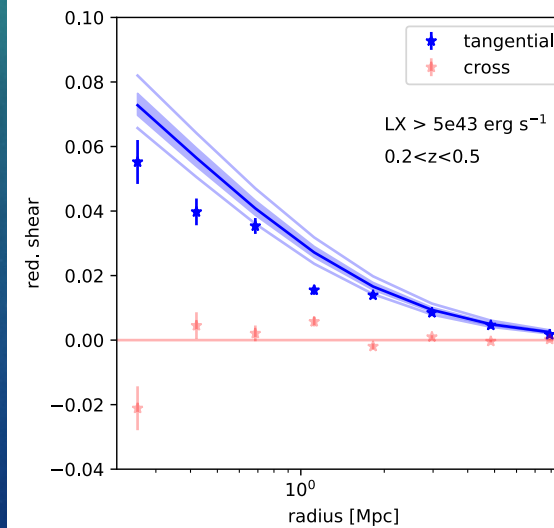
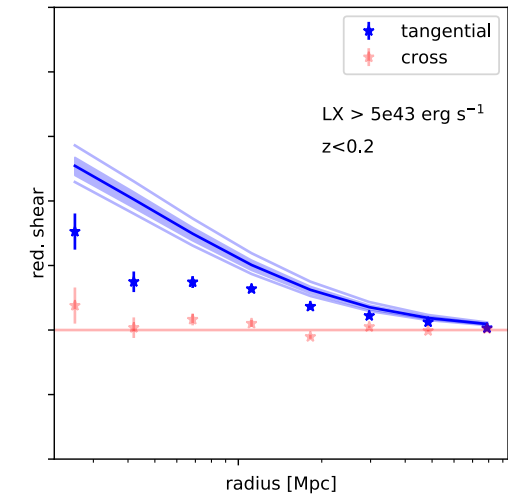
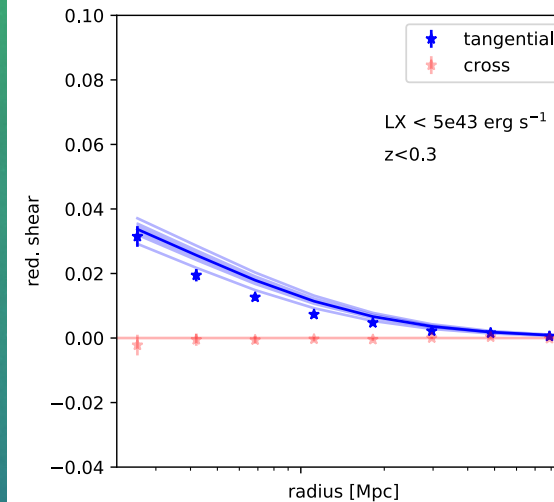
# Mass Calibration

## PREDICTED SHEAR PROFILES

- Points: stacked shear profiles in redshift and luminosity bins
- Lines: forward modeled shear profiles using NFW and masses from Bulbul+18 Luminosity-mass-redshift relation and redshift distributions of shear galaxies

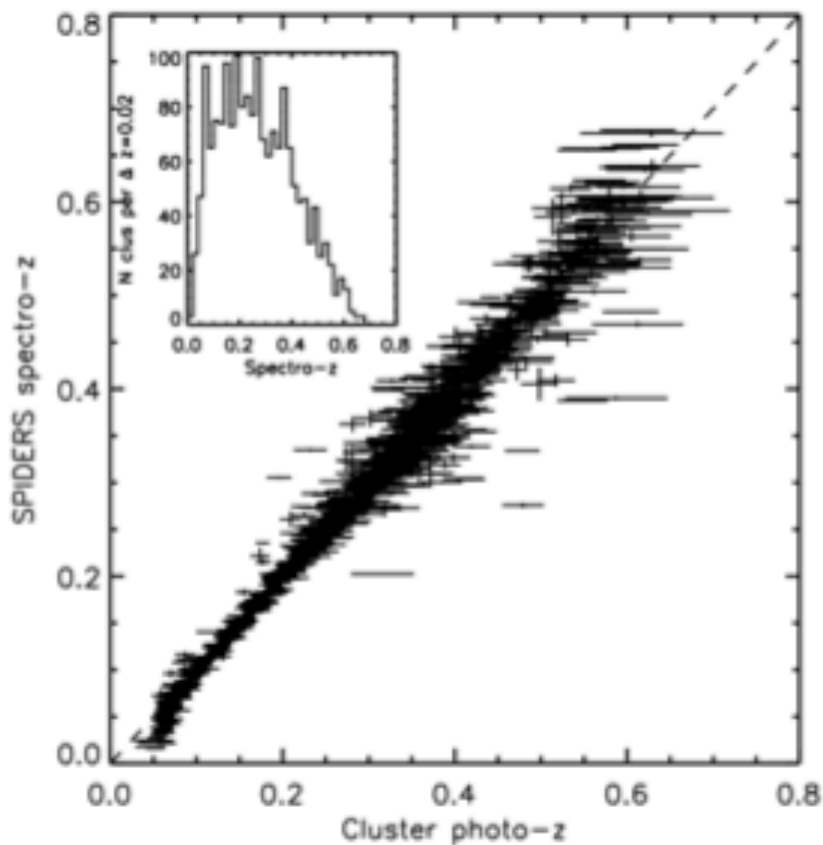
Provided by Sebastian Grandis

eROSITA CWG Meeting | 24. Apr 2018 | Paulus





## Galaxy clusters: status (current)



### Status 2018-04-19 (CODEX)

3022 candidates richness > 10

- 2057  $N_{\text{spec}} > 3$
- 1162  $N_{\text{spec}} > 10$
- 650  $N_{\text{spec}} > 15$

Of them: 2612/3022 completed

- 1754  $N_{\text{spec}} > 3$
- 1014  $N_{\text{spec}} > 10$
- 577  $N_{\text{spec}} > 15$

*Numbers valid prior to catalogue validation*



LMU  
TRIAXIALITY

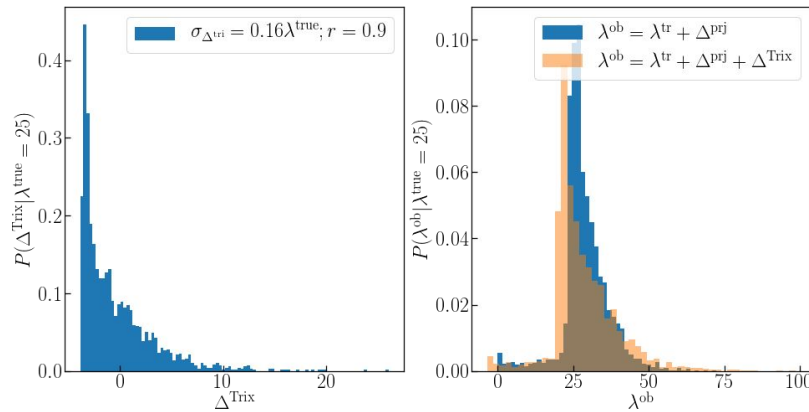
LUDWIG-  
MAXIMILIANS-  
UNIVERSITÄT  
MÜNCHEN

# Luminosity Function

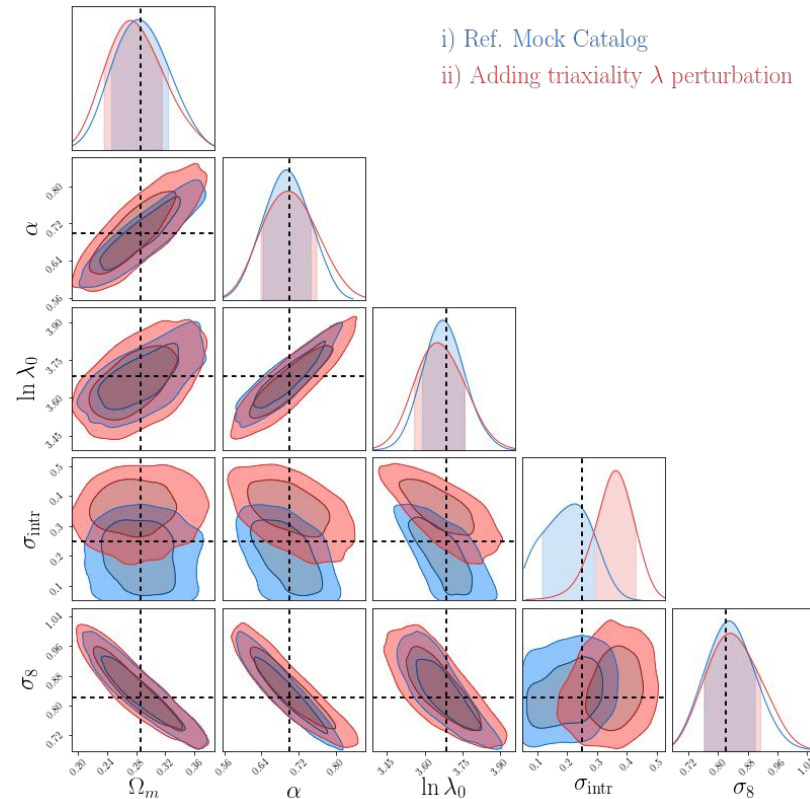


$$E[X|Y] = E[X] + \rho \frac{\sigma_x}{\sigma_y} (Y - E[Y])$$

$$\langle \Delta^{\text{true}} | \Delta^{\text{prj}} \rangle = \langle \Delta^{\text{true}} | M \rangle_0 + r_{\Delta^{\text{triax}}, \Delta^{\text{prj}}} \frac{\sqrt{\text{Var}(\Delta^{\text{triax}})}}{\sqrt{\text{Var}(\Delta^{\text{prj}})}} (\Delta^{\text{prj}} - \langle \Delta^{\text{prj}} | \lambda^{\text{true}}, z^{\text{true}} \rangle)$$

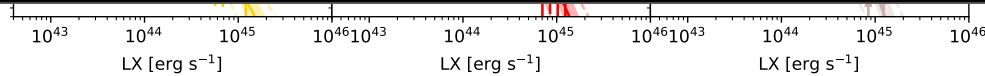


$\sigma_{\text{triax}} = 0.16$  (from Becker & Kravtsov, Figure 1)  
 $r = 0.9$  (conservative choice)



i) Ref. Mock Catalog  
ii) Adding triaxiality  $\lambda$  perturbation

eROSITA Consortium meeting - April 2018 | Matteo Costanzi



eROSITA Meeting | Cluster WG | 24. Apr 2018 | S. Grandis

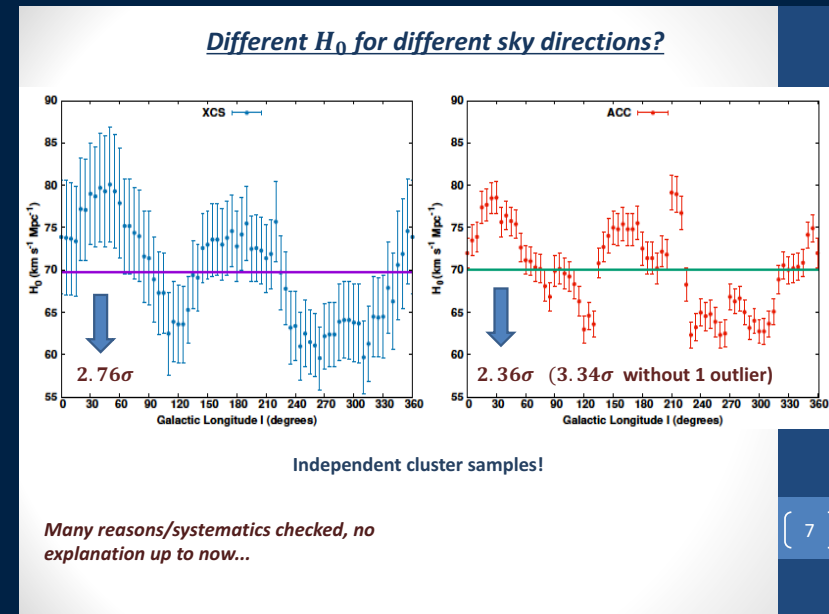
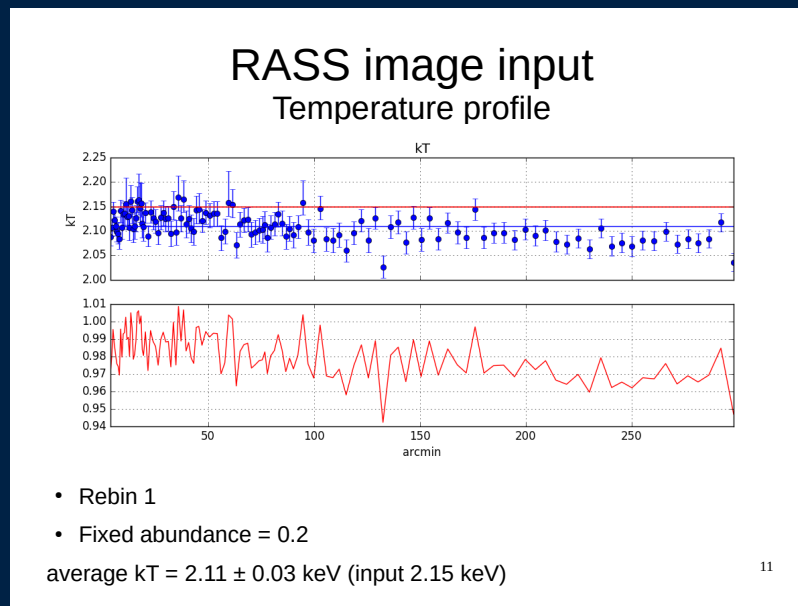
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# Local Clusters and Isotropy

- **Antonio Pérez:** modeled eROSITA observation of Virgo cluster and tested ability to recover the temperature profile to large radius



- **Konstatinos Mikkas:** showed intriguing results suggesting that the L-T relation normalization varies with galactic longitude



# Status

- Lots of activity/good successes in all critical areas needed for cluster and cosmology studies
- Still much to do
  - Study cluster selection in realistic mocks
  - Complete optical surveys over DE sky (DeROSITAS)
  - Build collaboration with HSC on WL mass calibration
  - Work through remaining details of eROSITA cosmo pipelines
  - Push through cosmology validation with CODEX and 2RXS samples
  - ...