Characterising our Universe with the REFLEX II cluster survey

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REFLEX
ROSAT-ESO flux-limited X-ray clusters

- Extended REFLEX (REFLEX II) is completed (P.I. Hans Böhringer)
- Northern counterpart is being compiled
- Largest, homogenous flux-limited sample of X-ray clusters
REFLEX and NORAS cluster survey

REFLEX II 918 clusters
NORAS II 882 clusters
$F > 1.8 \times 10^{-12} \text{ erg s}^{-1} \text{ cm}^{-2}$

REFLEX I: 18 runs La Silla
REFLEX II: 9 runs ESO 3.6m/NTT
NORAS 10 runs C.A. 2 runs K.P.

Chon & Böhringer, 2012
Large-scale structure probed by REFLEX superclusters

Chon et al., 2013
Chon et al., 2014, accepted, A & A
Observed and predicted $L_x$

Prediction from a flat LCDM model $\Omega_m = 0.27$, $\sigma_8 = 0.8$ and REFLEX II XLF
Luminosity function for REFLEX II

Böhringer, Chon, Collins 2014
REFLEX II cosmological constraints

$\Omega_m = 0.27 \pm 0.03$
$\sigma_8 = 0.80 \pm 0.03$

$\Omega_m = 0.29 \pm 0.04$
$\sigma_8 = 0.77 \pm 0.07$

Böhringer, Chon, Collins 2014
Constraints from X-ray and Optical

Vikhlinin et al. 2009

Rozo et al. 2010
Observables to mass conversion

Reiprich & Böhringer (2002)

Pratt, Böhringer et al. (2009)
REFLEX II : Cosmological constraints for two versions of scaling relation
Influence of scaling relation

slope ± 5%, normalisation ± 10%, scatter ± 10%

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Conclusions

- Probing Cosmology and LSS with REFLEX clusters
- Accurate measurement of X-ray luminosity function
- No significant signature of z-evolution of $L_x$ at $z \leq 0.4$
- Cosmological constraints on $\Omega_m$ and $\sigma_8$
  - Good agreement with existing results – except some tension with Planck CMB
- Accurate mass determination is necessary for cosmological applications → REFLEX-VLS + XMM