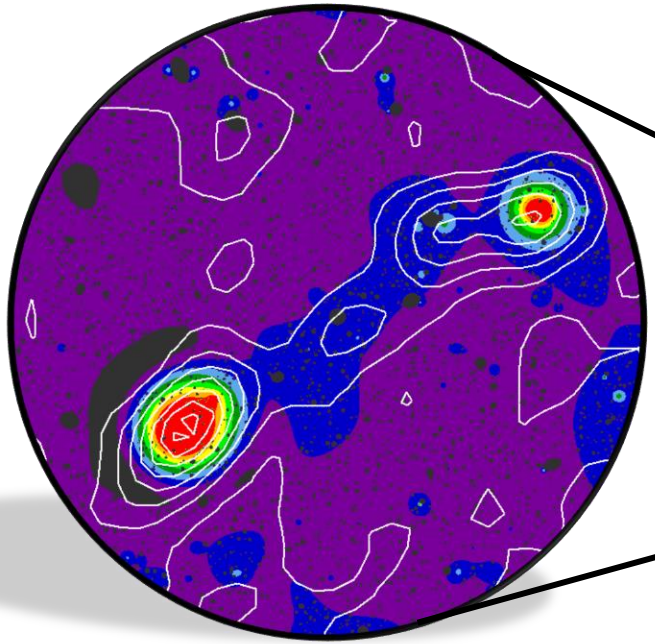
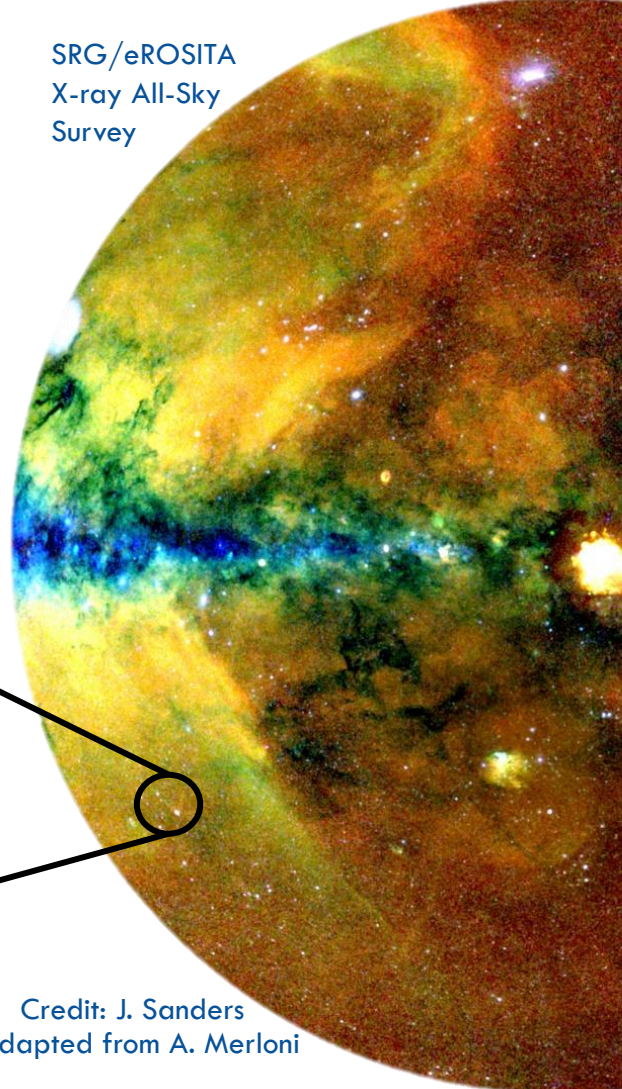
UNIVERSITÄT BONN

Astronomy Australia Ltd.

eROSITA

DISCOVERY OF A >13 MPC LONG X-RAY FILAMENT USING eROSITA DATA

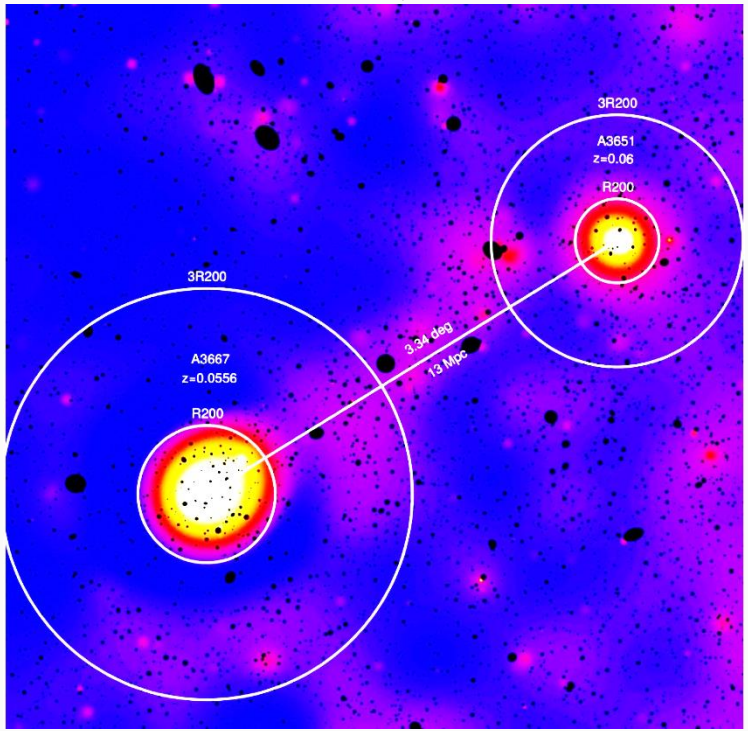




SRG/eROSITA
X-ray All-Sky
Survey

Credit: J. Sanders
Adapted from A. Merloni

SYSTEM OVERVIEW

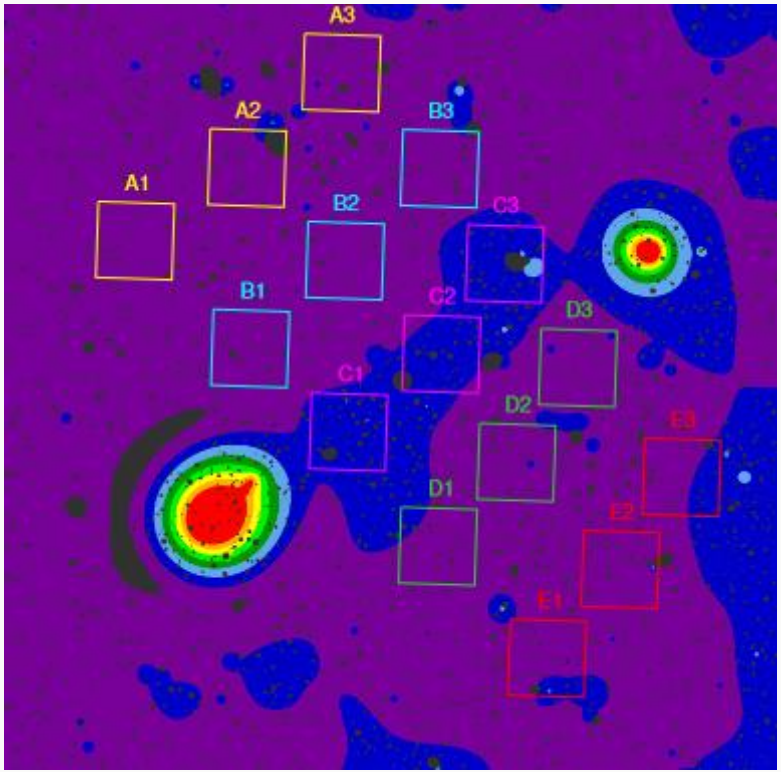


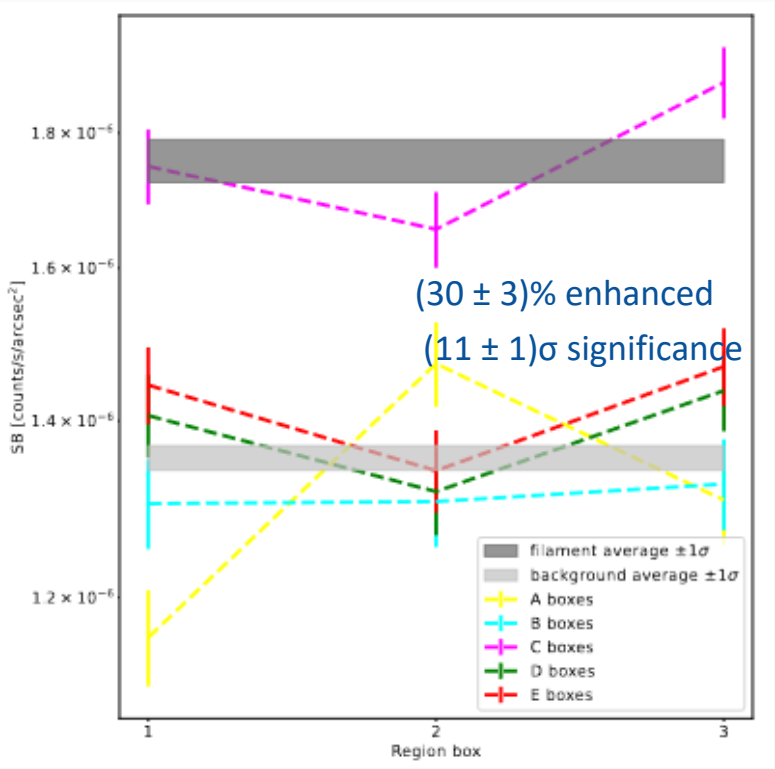
Galaxy Clusters:

- located at the nodes of cosmic web filaments
- bright X-ray sources due to bremsstrahlung of ICM
- very few individual gas filaments detected, none beyond the cluster outskirts

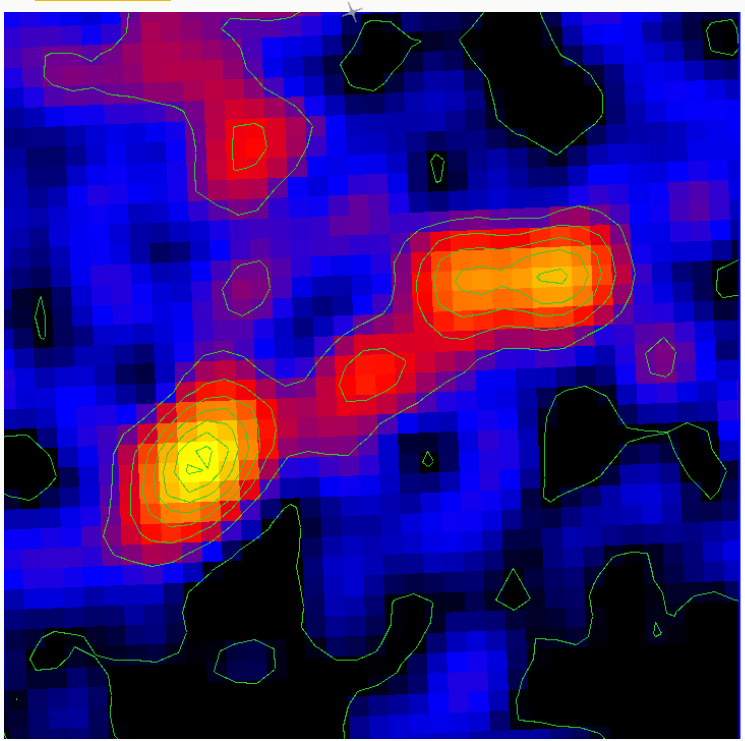
data reduced eRASS:4 in energy band $0.3 - 2.0$ keV, wavelet filtered

SURFACE BRIGHTNESS ANALYSIS

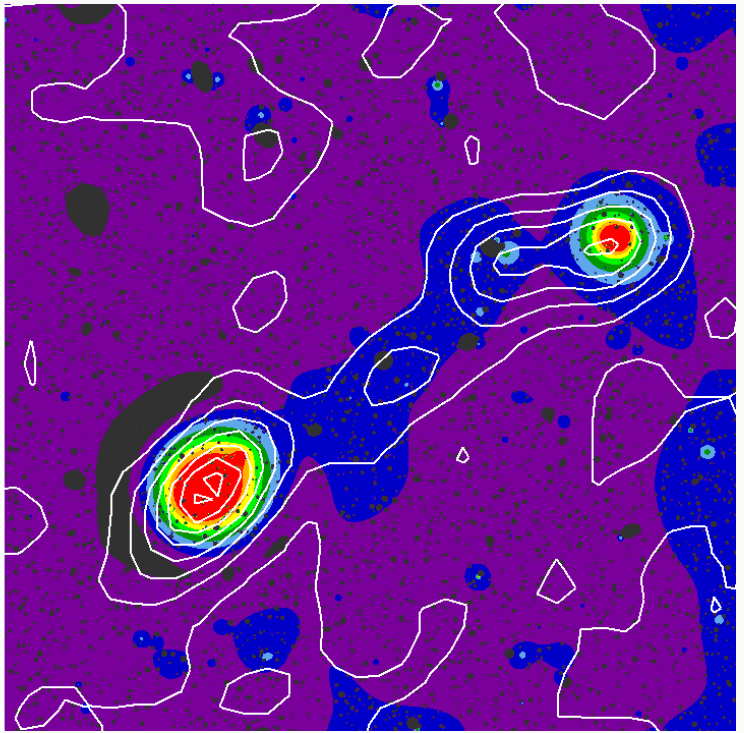




TWO MICRON ALL SKY SURVEY

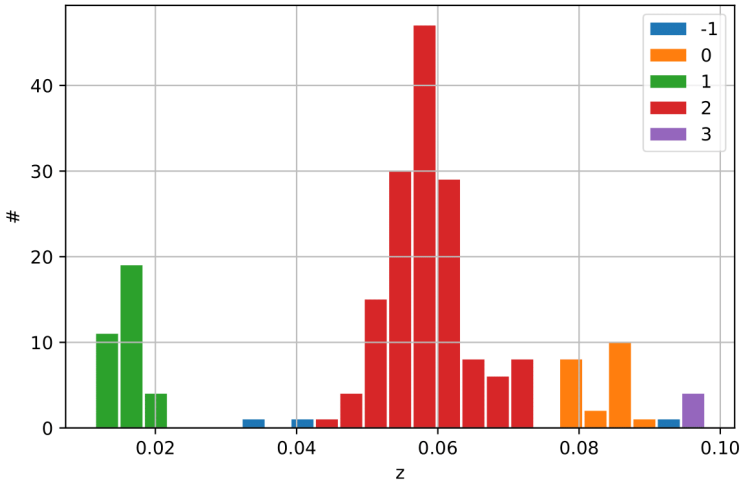


2MASS: Jarrett et al., 2000

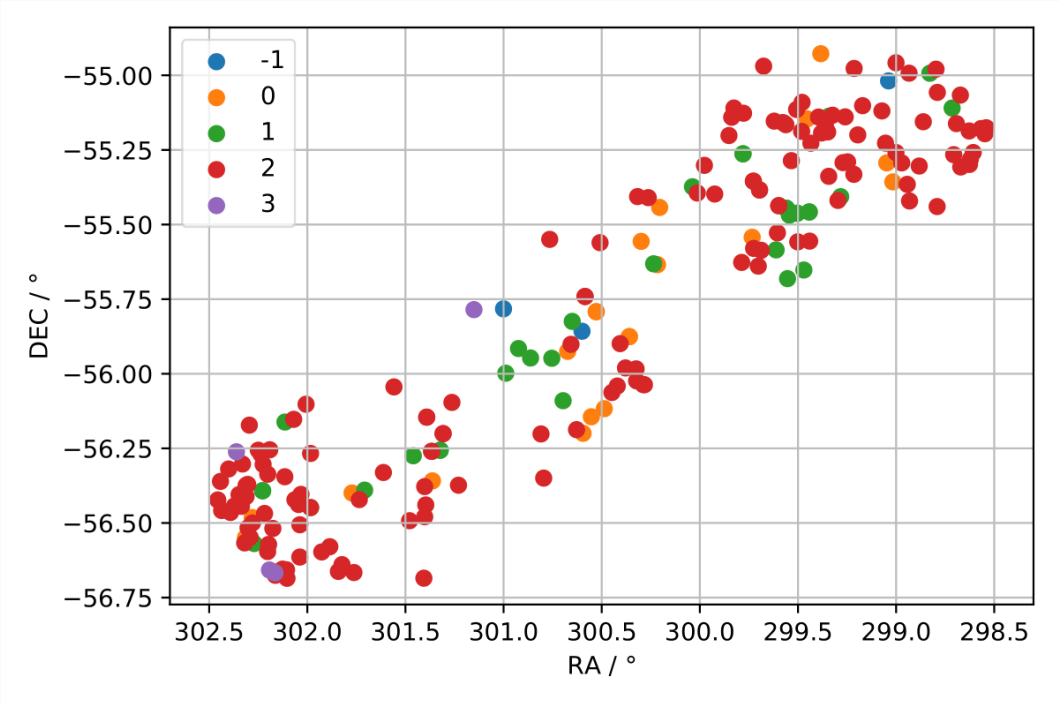


eROSITA X-Ray with 2MASS contours

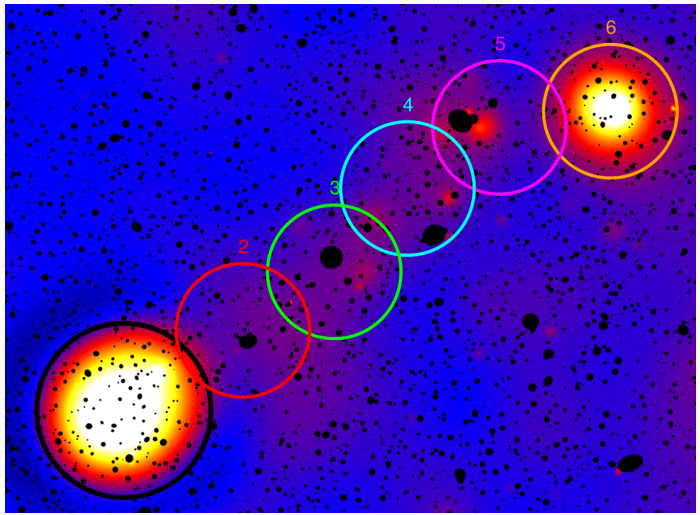
SOURCES BETWEEN THE CLUSTERS



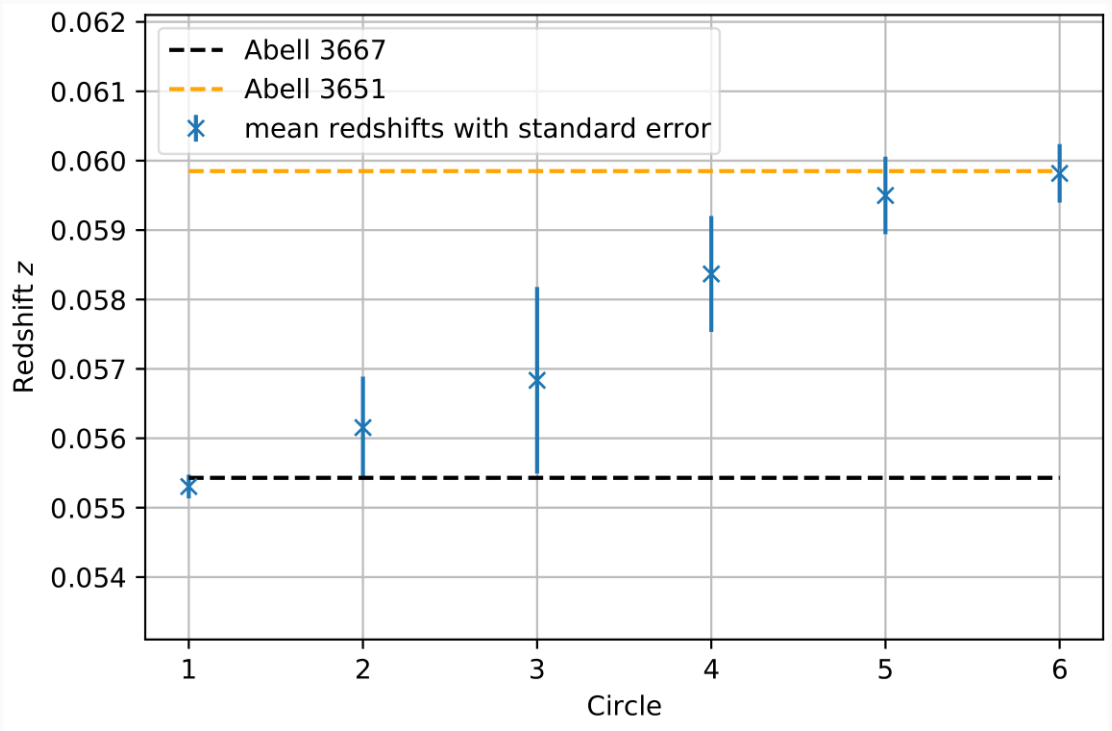
Galaxies from NED
Categorized by DBSCAN



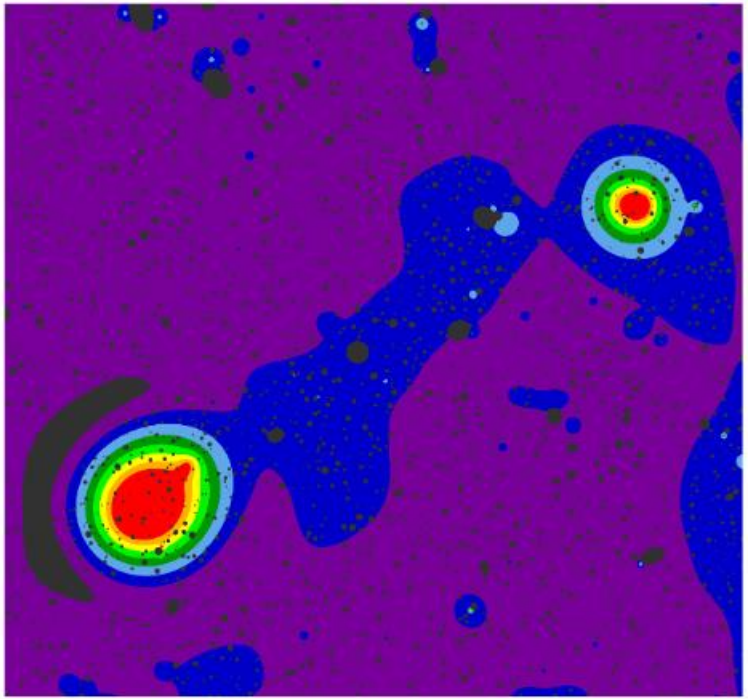
REDSHIFT ANALYSIS



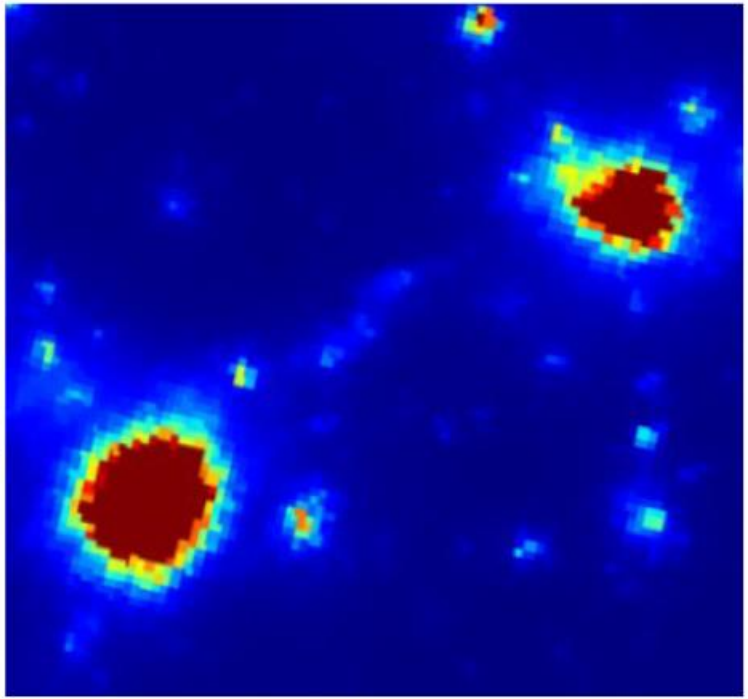
Redshift progression
from A3667 to A3651



SLOW SIMULATION

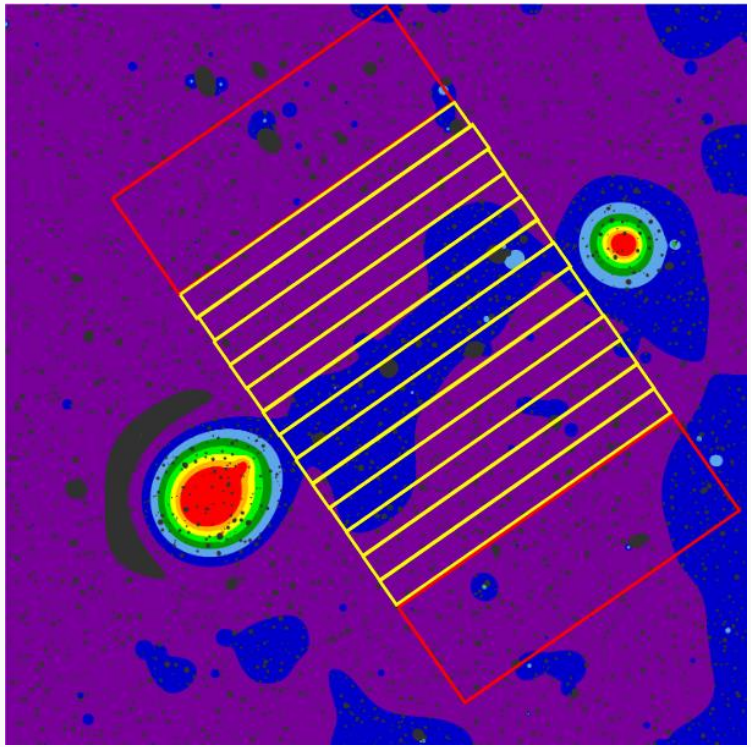


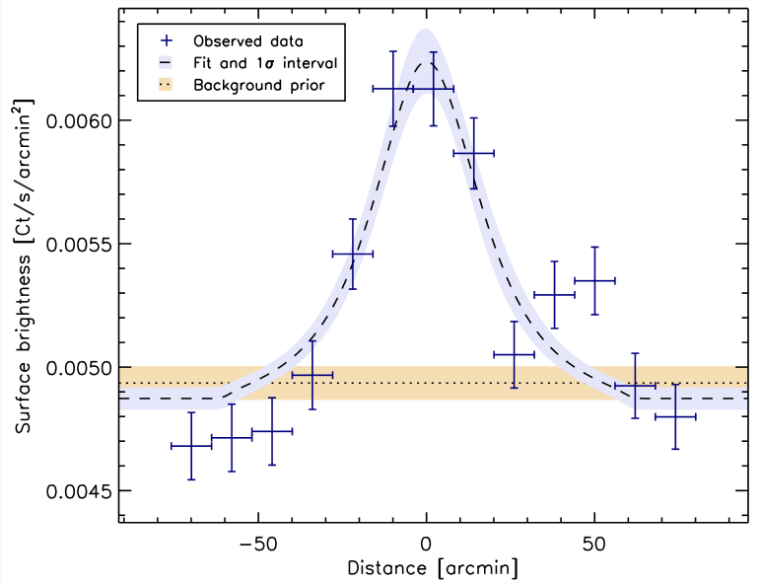
eROSITA X-Ray



SLOW, Credits: Klaus Dolag, Benjamin Seidel

FILAMENT GAS PROPERTIES



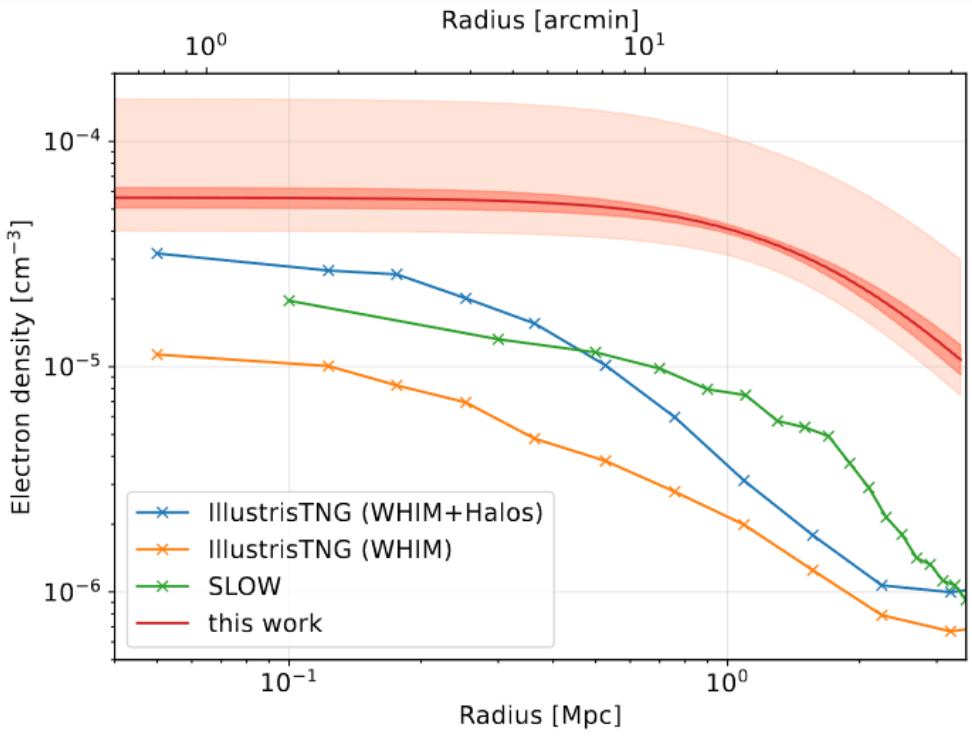


$$F_{\mathrm{X}} = (7.1^{+0.8+1.3}_{-0.8-0.2}) \times 10^{-12}\ \mathrm{erg\ s^{-1} cm^{-2}}$$

$$M_{\mathrm{gas}} = \left(2.8^{+0.2+5.2}_{-0.2-0.8}\right) 10^{14} M_{\mathrm{sun}}$$

$$\delta = 220^{+20+370}_{-20-45}$$

COMPARISON TO TNG FILAMENTS

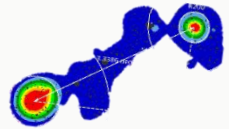


Comparison to WHIM filaments
- in *IllustrisTNG*
- with $L > 20$ Mpc
- at z=0
- by Galárraga-Espinosa at al., 2021

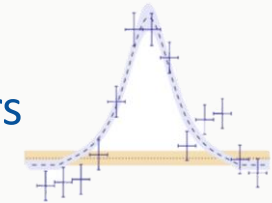
SUMMARY

Analysis of reduced data in the energy band $0.3 - 2.0$ keV shows:

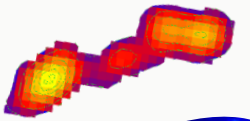
- filament structure ~ 13 Mpc length, beyond $3R_{200}$



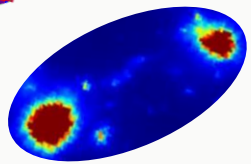
- 30% enhanced emission with 11σ in the region between the clusters



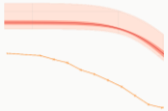
- sources align along filament



- filament reprocuded in *SLOW*



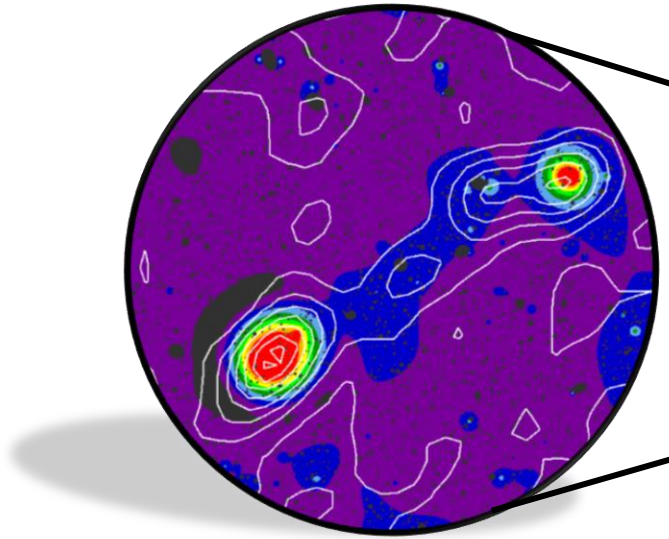
- comparison of filament gas properties to *IllustrisTNG*

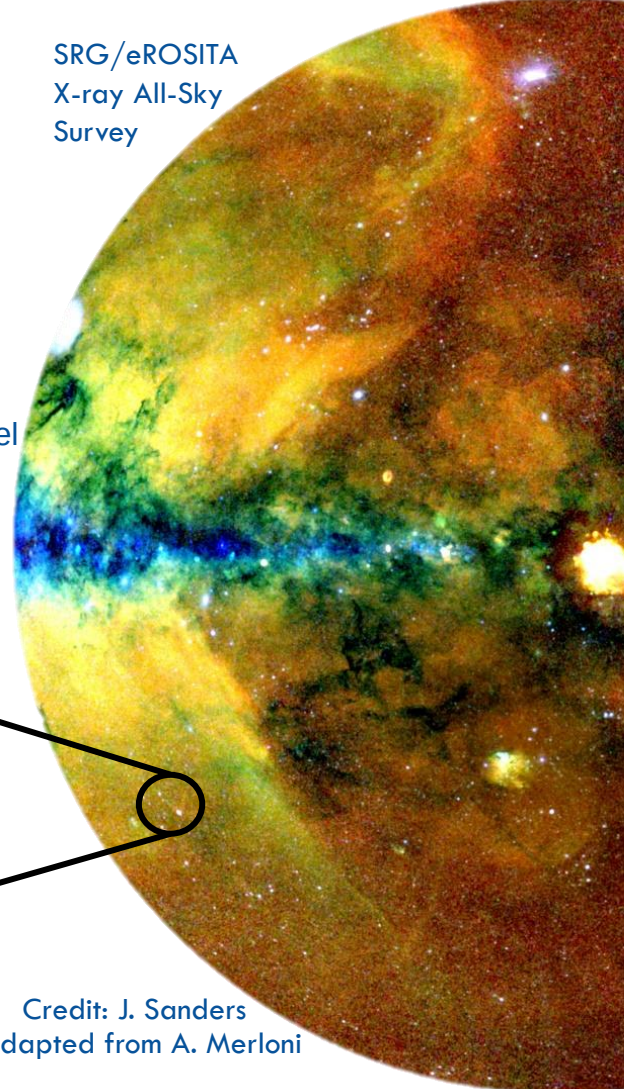


DISCOVERY OF A >13 MPC LONG X-RAY FILAMENT USING eROSITA DATA

J. Dietl, F. Pacaud, T. H. Reiprich, A. Veronica, K. Migkas, C. Spinelli, K. Dolag, and B. Seidel

https://arxiv.org/abs/2401.17281





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