

The background of the slide is a complex, fractal-like structure representing the cosmic web, with a color palette of deep purple, magenta, and bright yellow-orange. It consists of a dense network of interconnected filaments and nodes, resembling a spiderweb or a neural network.

CARDIFF
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SPICA workshop

RAS, 22nd of January 2016

Investigating LSS and environment of dusty galaxies with SPICA

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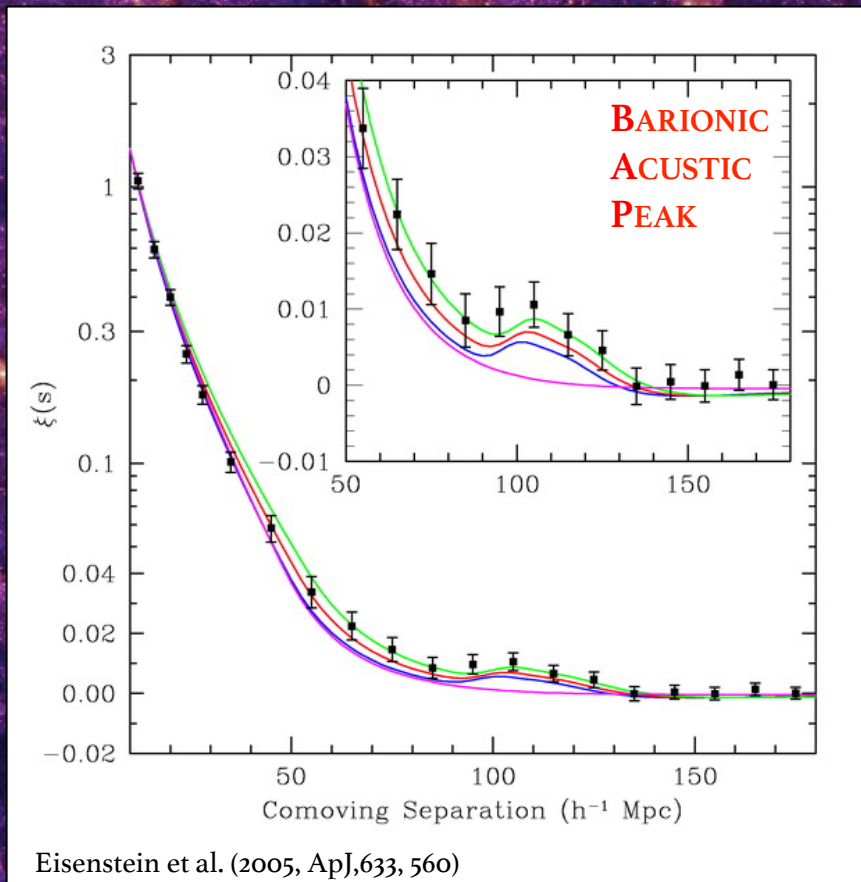
A visualization of the cosmic web, showing a complex network of dark matter filaments and clusters. The filaments are represented by thin, purple lines, while the clusters are shown as bright, yellowish-orange points. The background is a deep purple color.

Large Scale Structure (LSS):

- Cosmological parameters
- Dark matter halo mass

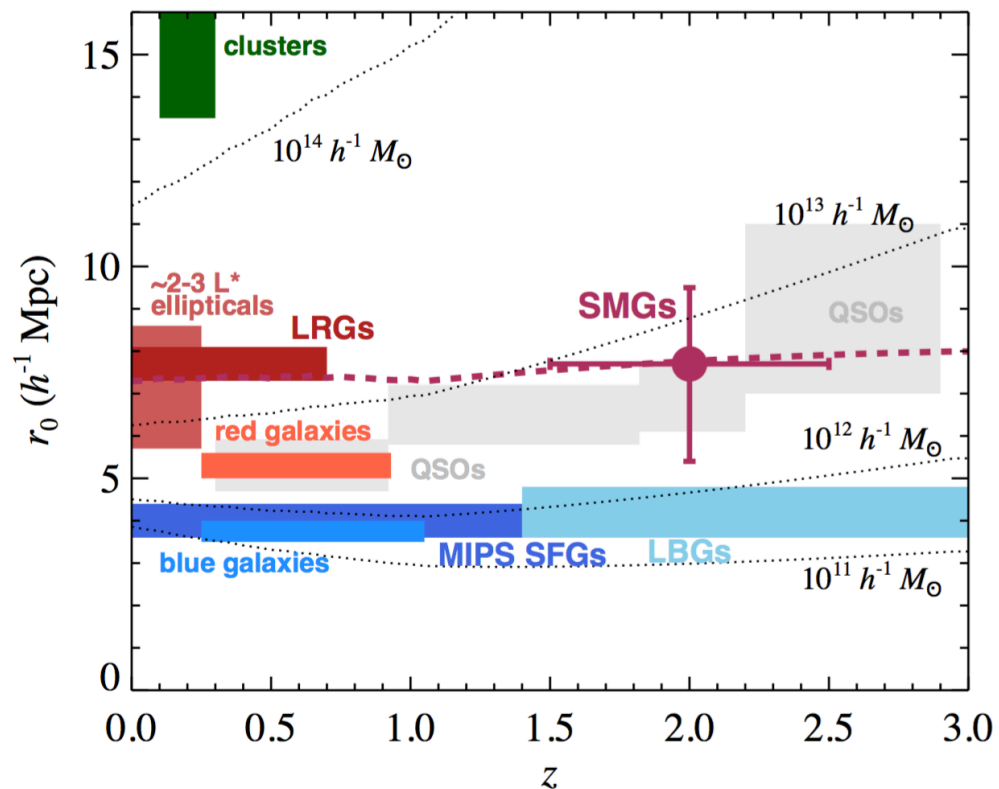
Large Scale Structure (LSS):

- Cosmological parameters
- Dark matter halo mass



Large Scale Structure (LSS):

- Cosmological parameters
- Dark matter halo mass



A visualization of the cosmic web, showing a complex network of filaments and nodes of matter. The filaments are represented by thin, glowing purple and blue lines, while the nodes are represented by bright yellow and orange points. The overall structure is a dense, interconnected web of matter.

Large Scale Structure (LSS):

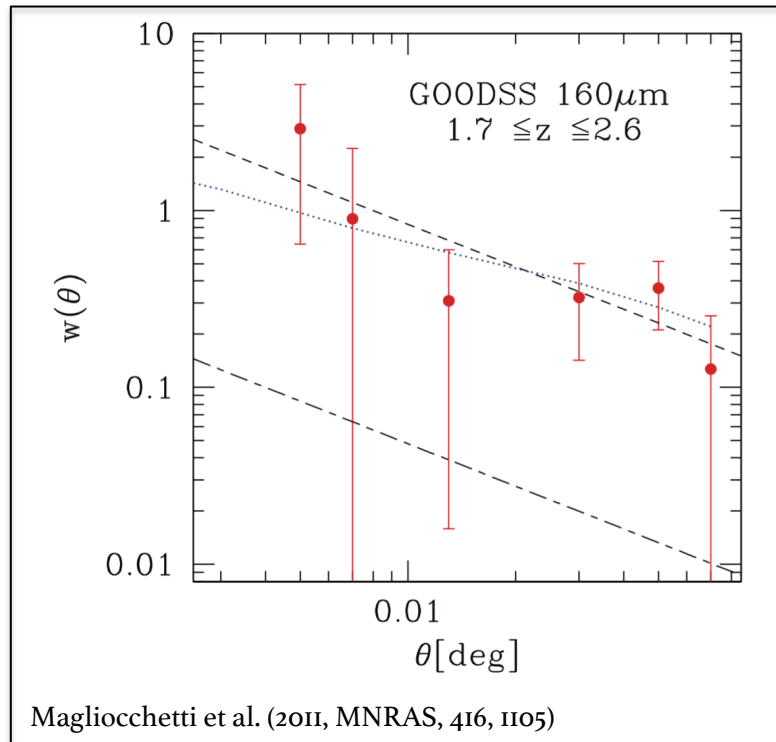
- Cosmological parameters
- Dark matter halo mass

Environment:

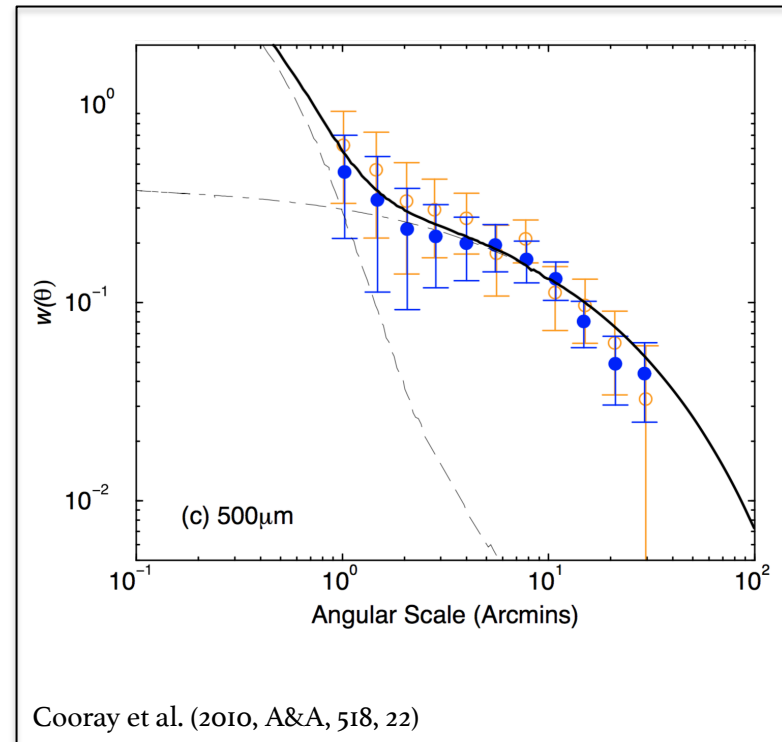
- SFR/BHAR in known clusters/group/voids
- Surrounding of known dusty galaxies

Clustering of dusty galaxies

SCUBA (Blain et al. 2004), LABOCA (Hickox et al. 2012),
Spitzer (Magliocchetti et al. 2008),
Herschel (Cooray et al. 2010, Maddox et al. 2010, Magliocchetti et al. 2011)



SMALL STATISTICS

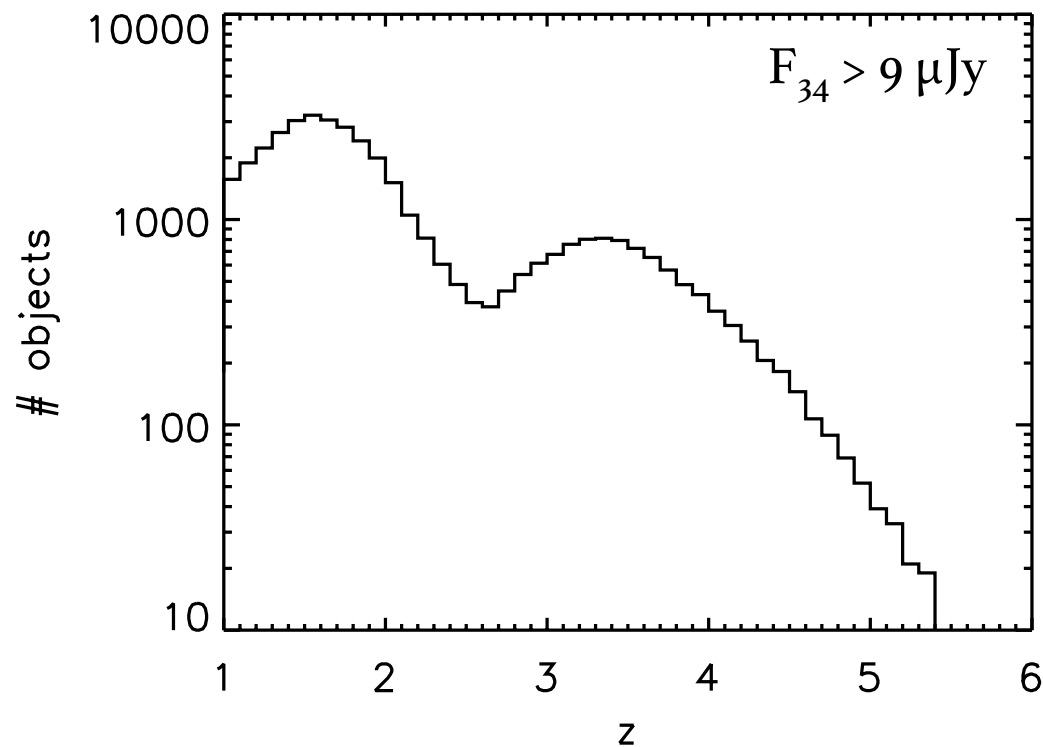


NO Z-SPEC INFO

Clustering of dusty galaxies

1 deg² survey with the SMI Camera at 30-37 μm

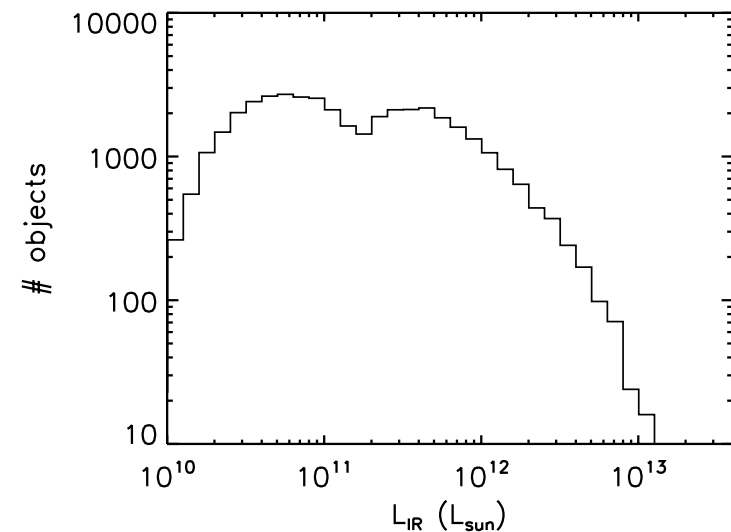
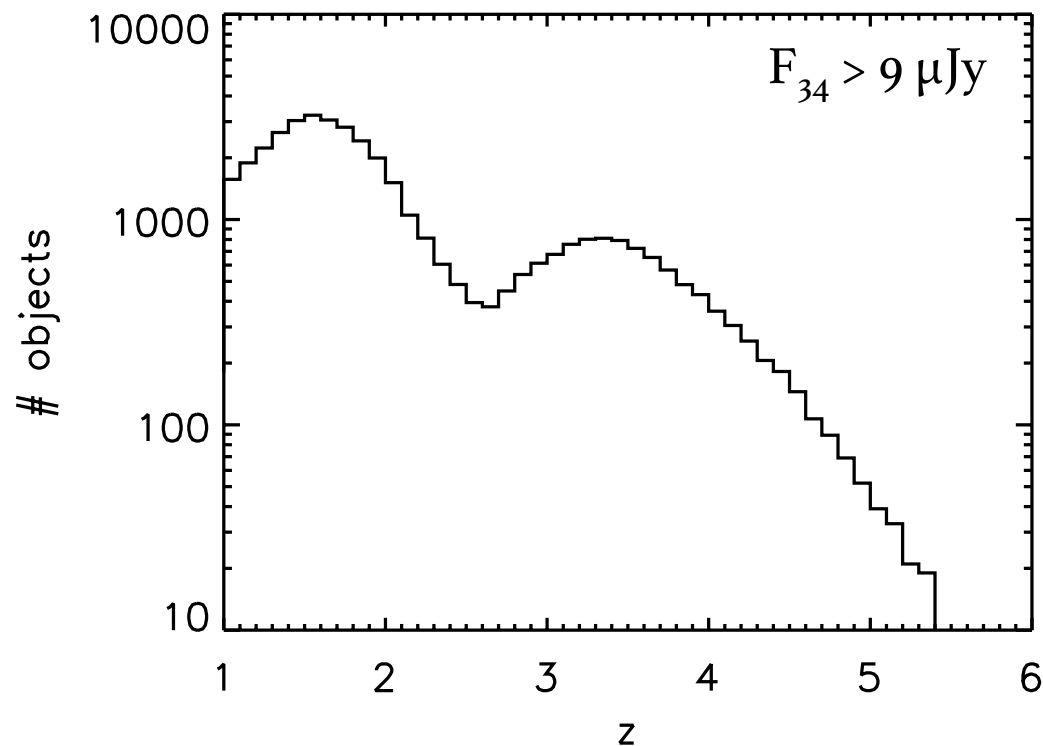
- confusion limited: 9 μJy
- Total time: 64 hours



Clustering of dusty galaxies

1 deg² survey with the SMI Camera at 30-37 μm

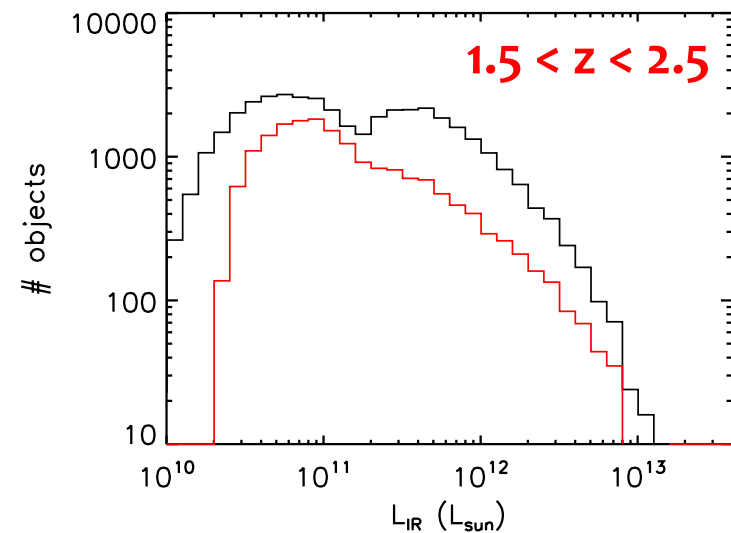
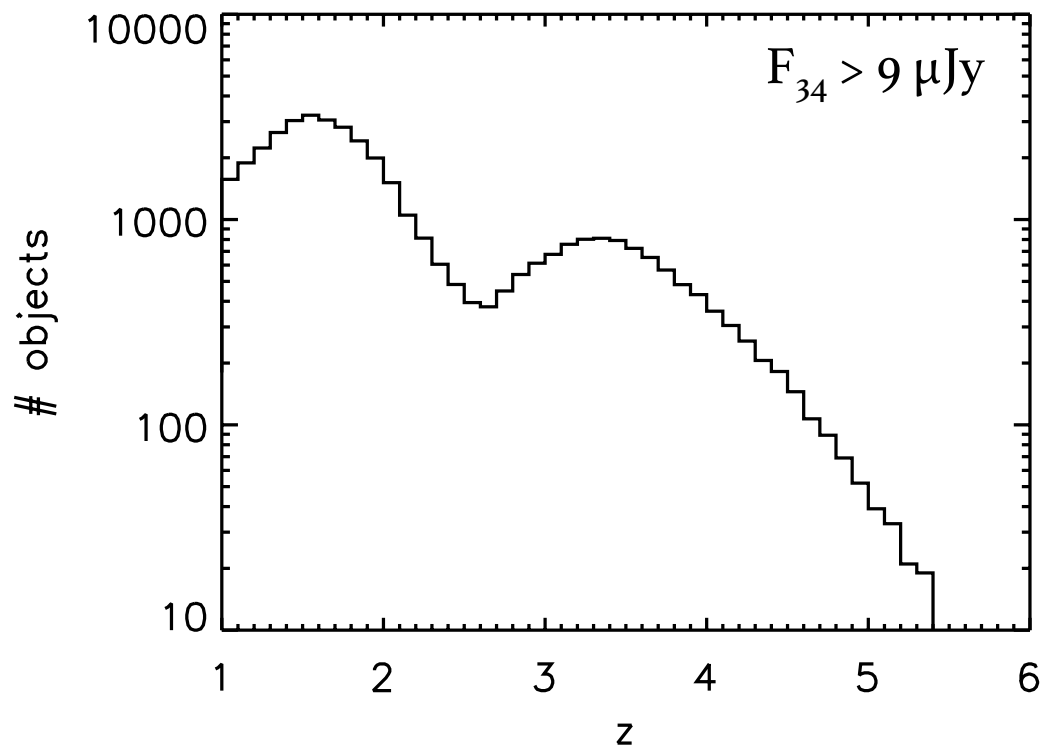
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Clustering of dusty galaxies

1 deg² survey with the SMI Camera at 30-37 μm

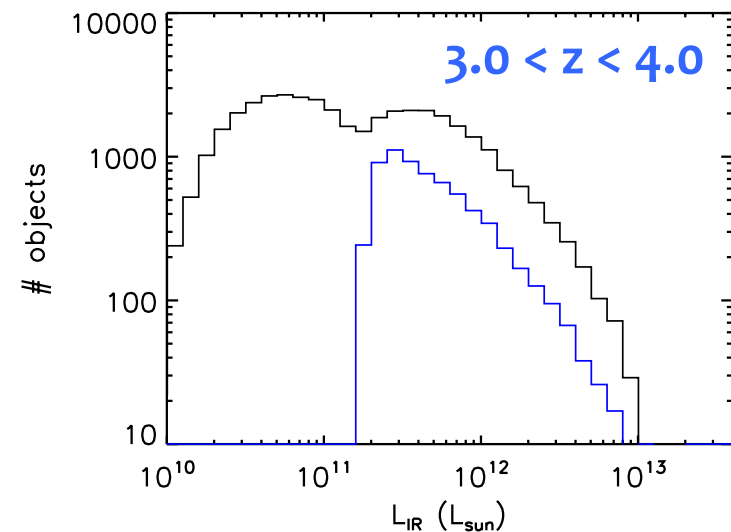
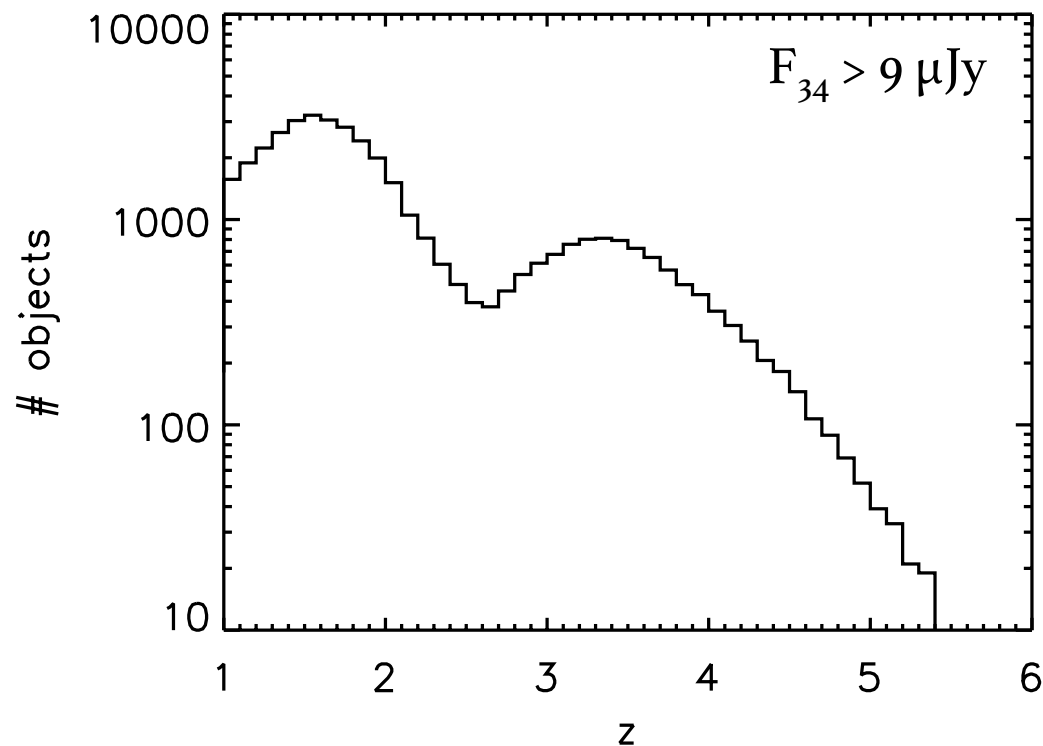
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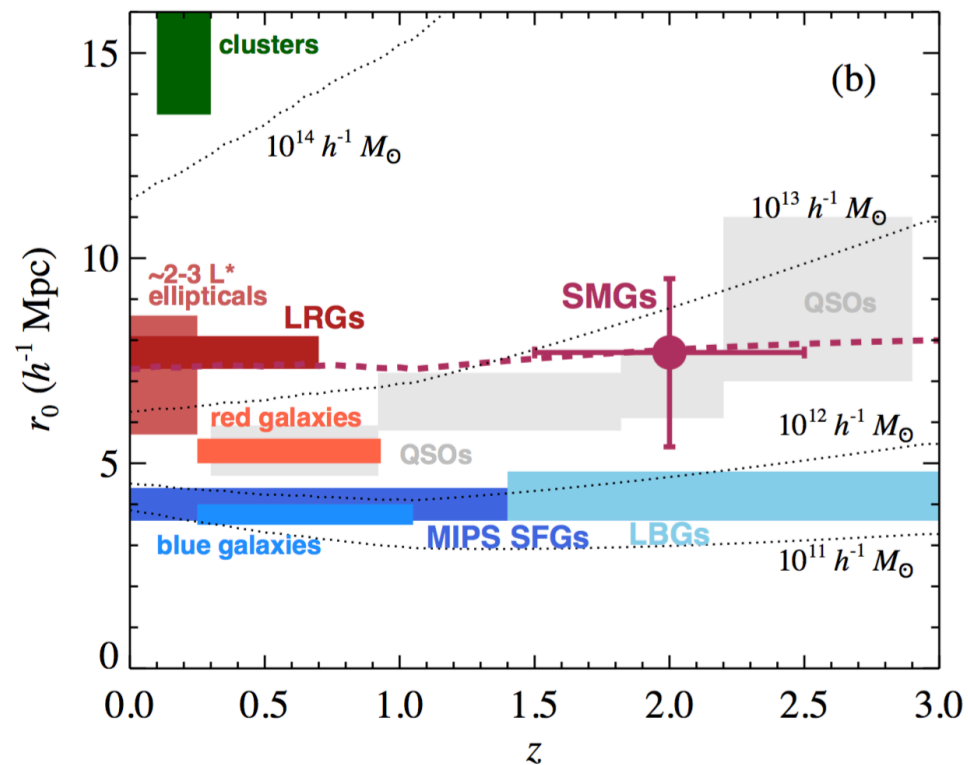
Clustering of dusty galaxies

1 deg² survey with the SMI Camera at 30-37 μm

- confusion limited: 9 μJy
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Clustering of dusty galaxies

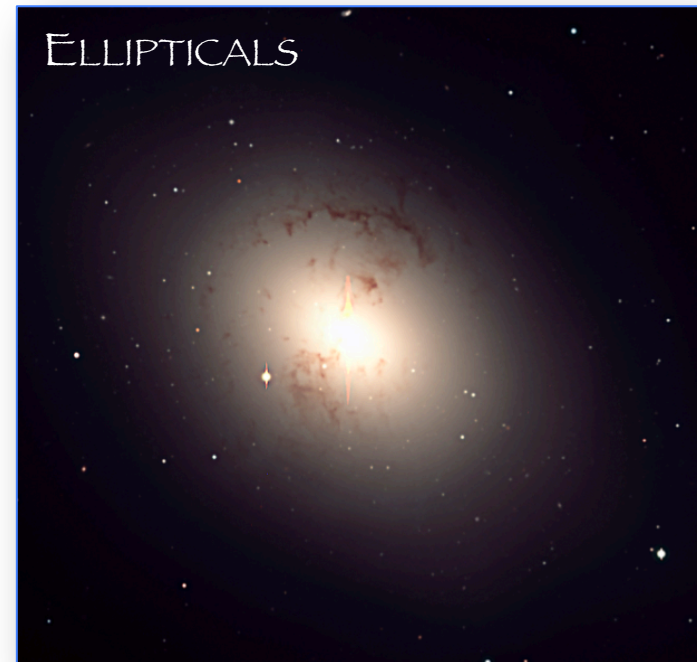
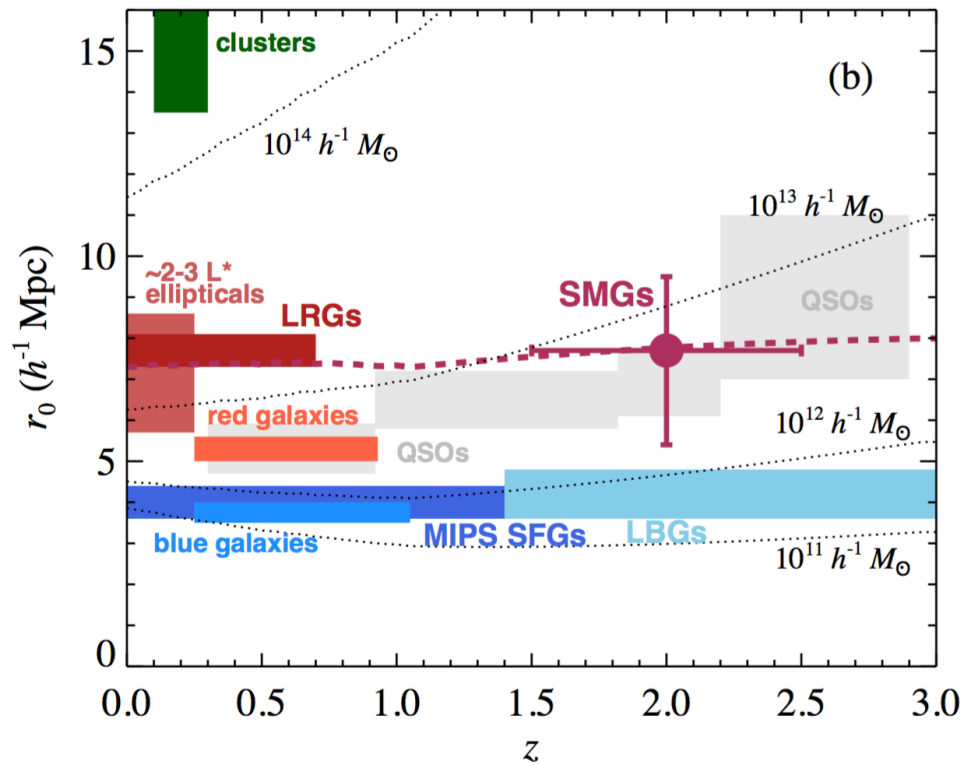


Strong clustering

$$M_{\text{halo}} \sim 10^{13} M_{\odot}$$

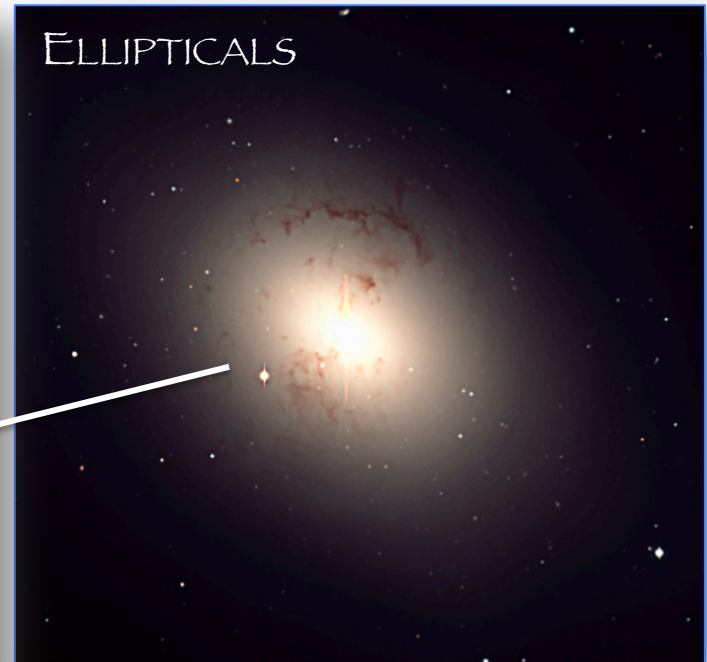
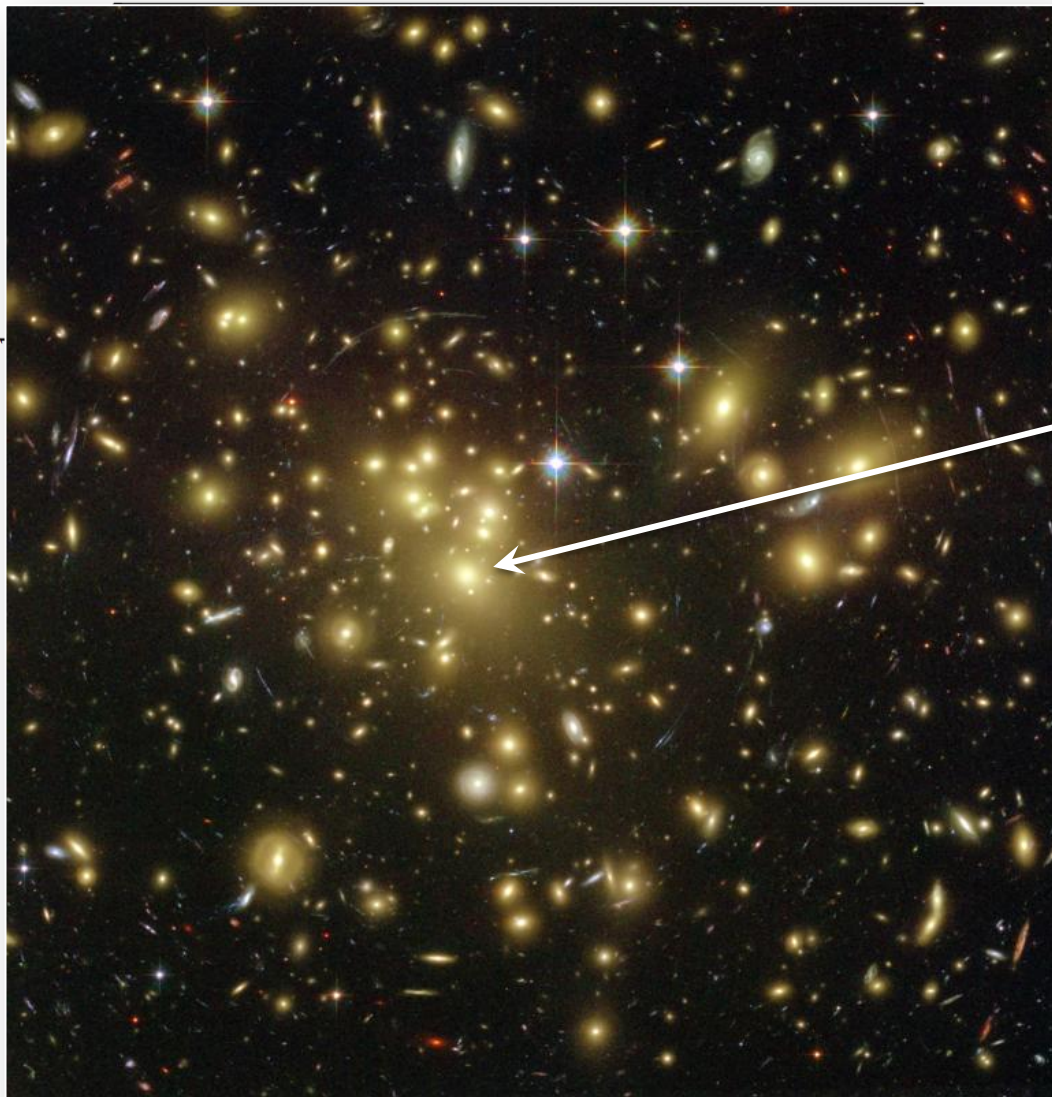
Hickox et al. (2012, MNRAS, 421, 284)

Clustering of dusty galaxies



Hickox et al. (2012, MNRAS, 421, 284)

Clustering of dusty galaxies

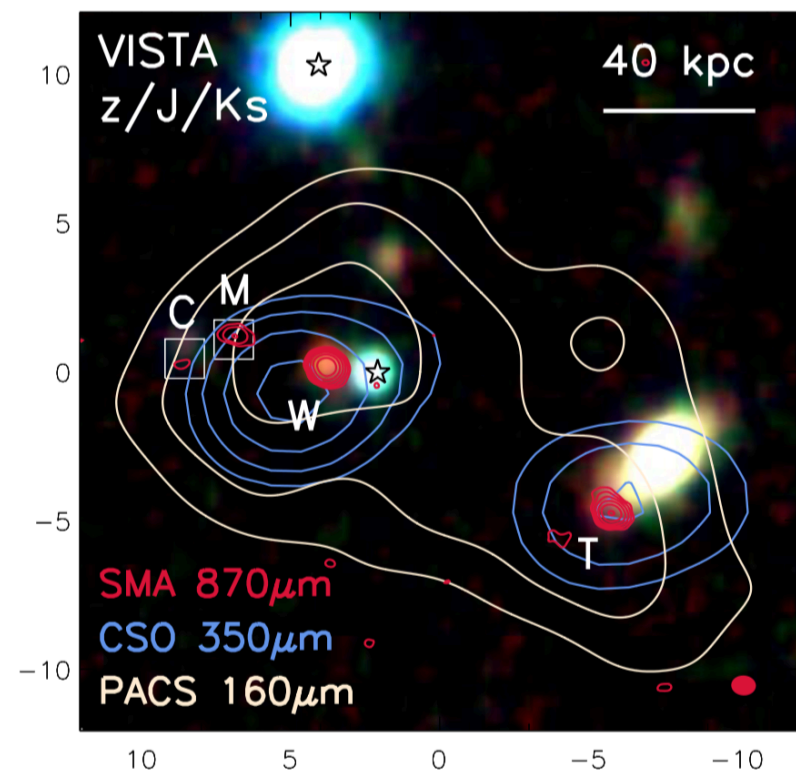
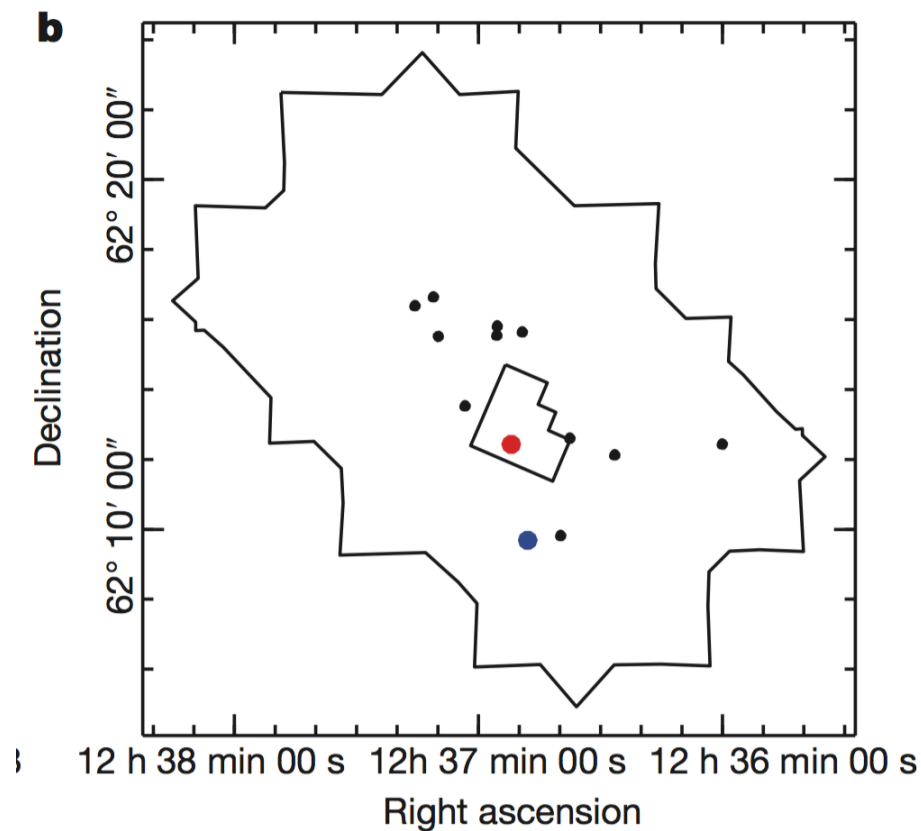


Dusty proto-clusters

SCUBA (Walter et al. 2012, Daddi et al. 2009), AzTEC (Kapac et al. 2011)

Herschel (Ivison et al. 2013), *Herschel* + *Planck* (Clements et al. 2014)

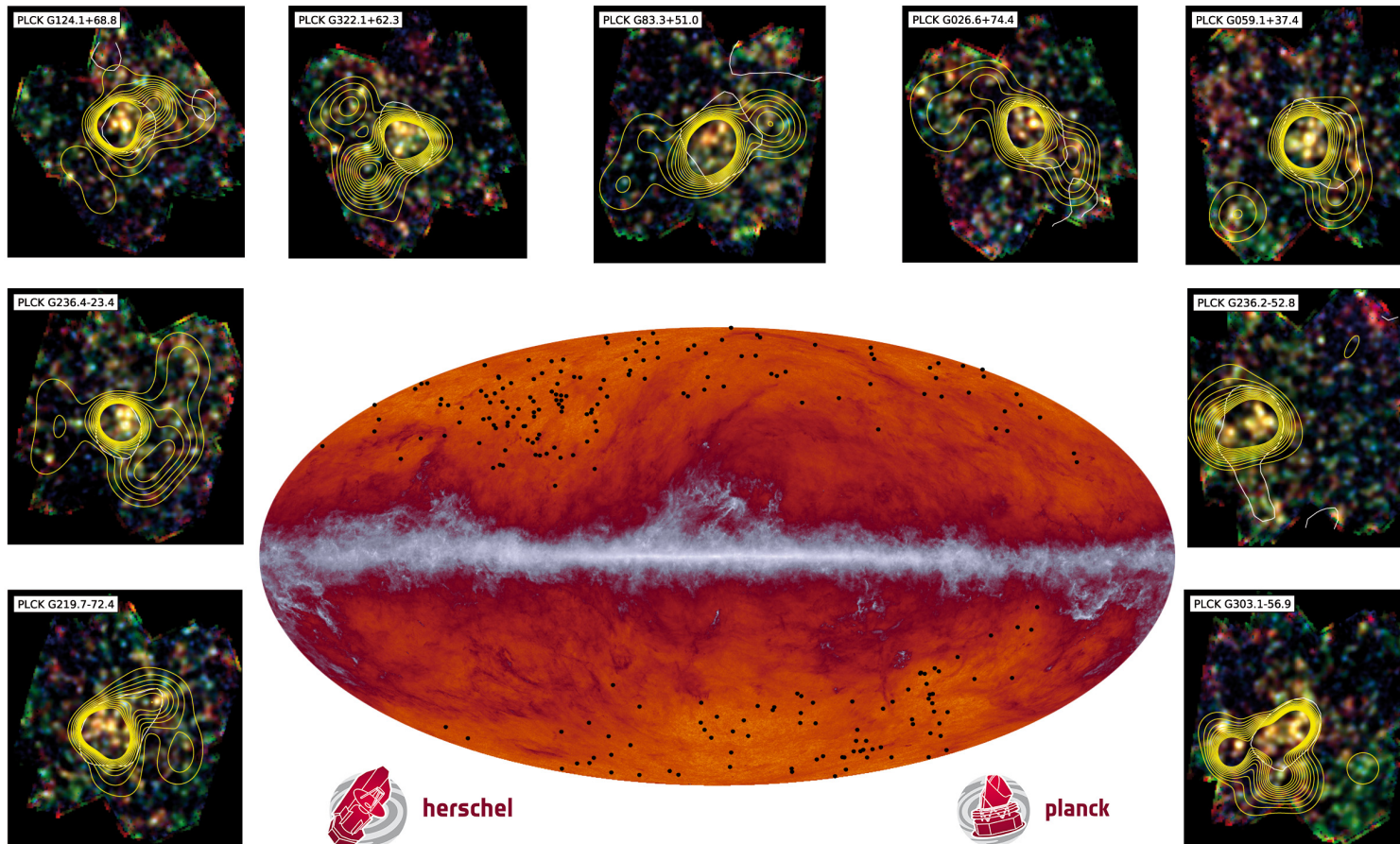
Planck (Planck intermediate results XXVII, 2015)



Dusty proto-clusters

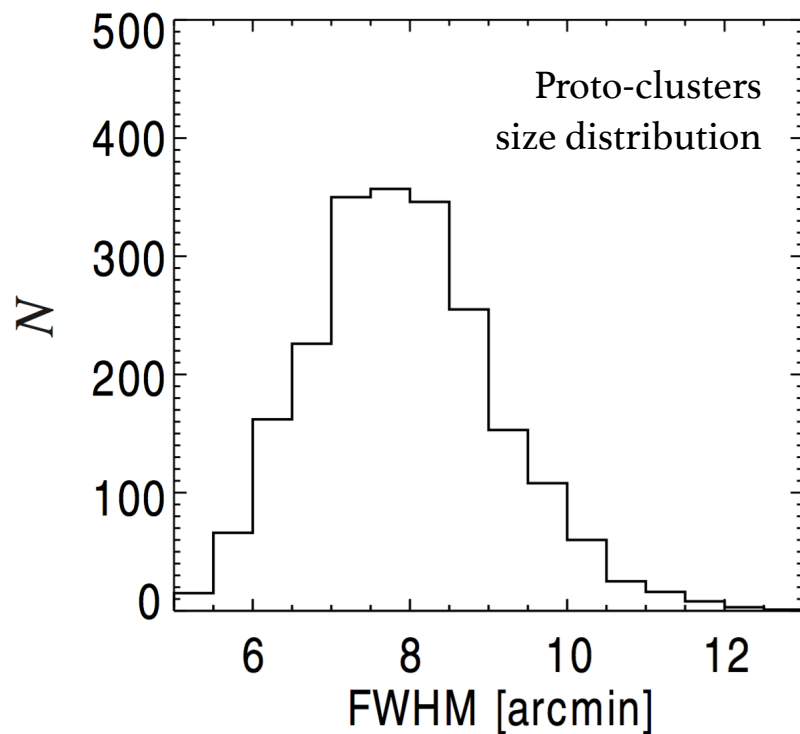
Planck collaboration XXXIX (2016, arXiv:1508.04171):

2151 candidate proto-clusters over 26% of the sky



Dusty proto-clusters

SMI FoV ($10' \times 10'$) is perfectly suited to map the proto-clusters



SPICA will

- Identify the proto-cluster members and measure their redshift (e.g. PAH)
- Confirm the LS structure/structures
- Study both SF and AGN activity in these dense environments

Conclusions

SPICA will help to understand

- Clustering of dusty galaxies down to $L_{\text{IR}} \sim 10^{11} L_{\odot}$, out to $z \sim 4$, and as a function of AGN activity
- SFR vs AGN activity in early stages of the formation of massive galaxy clusters