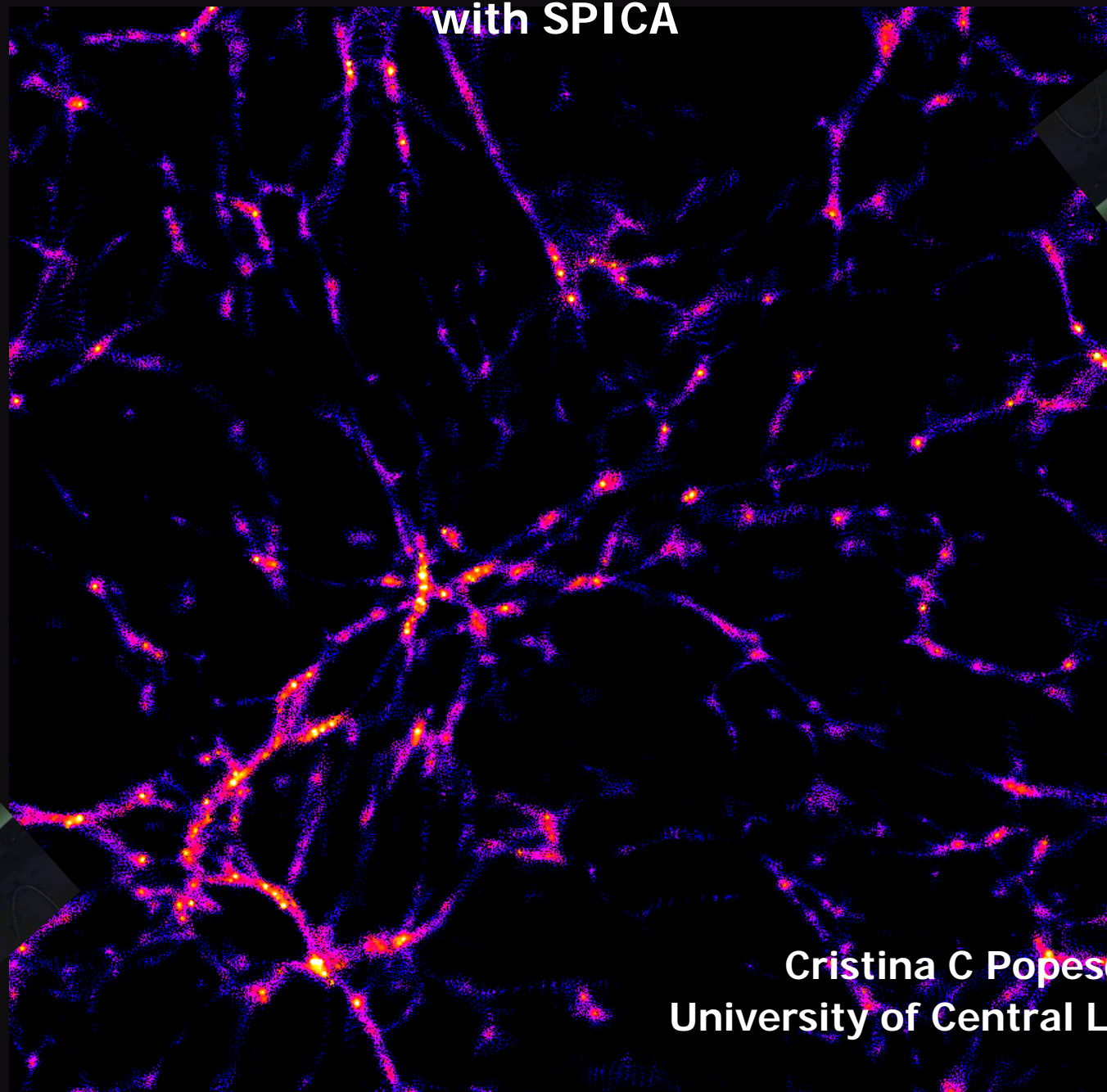
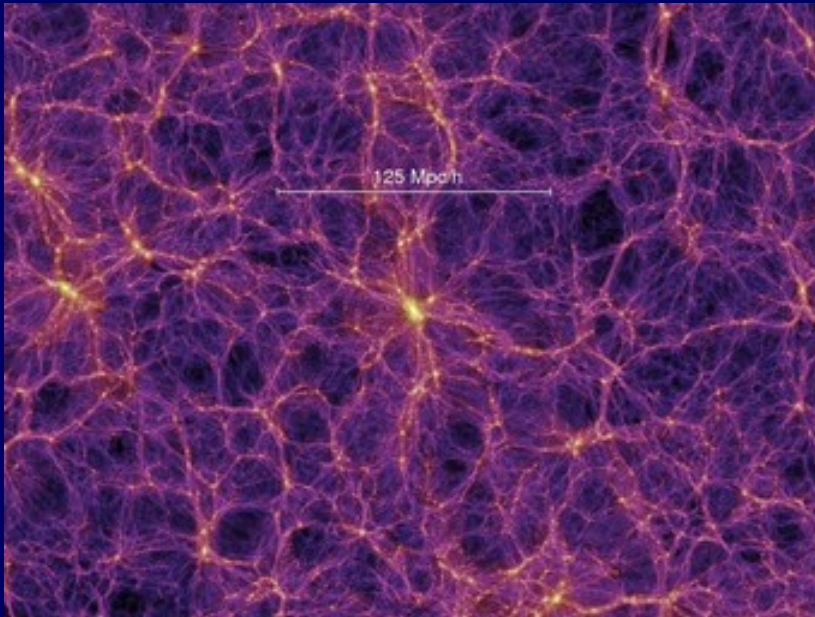


Probing the circumgalactic and intergalactic medium with SPICA

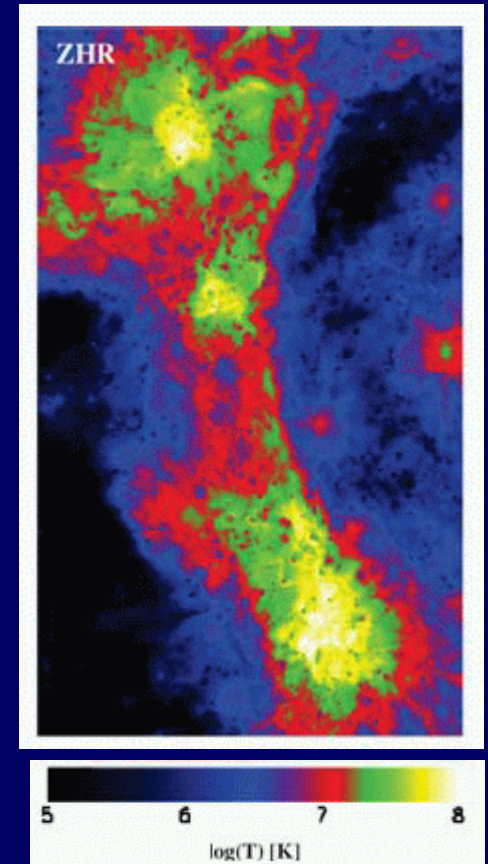


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Cooling of the warm-hot intergalactic medium

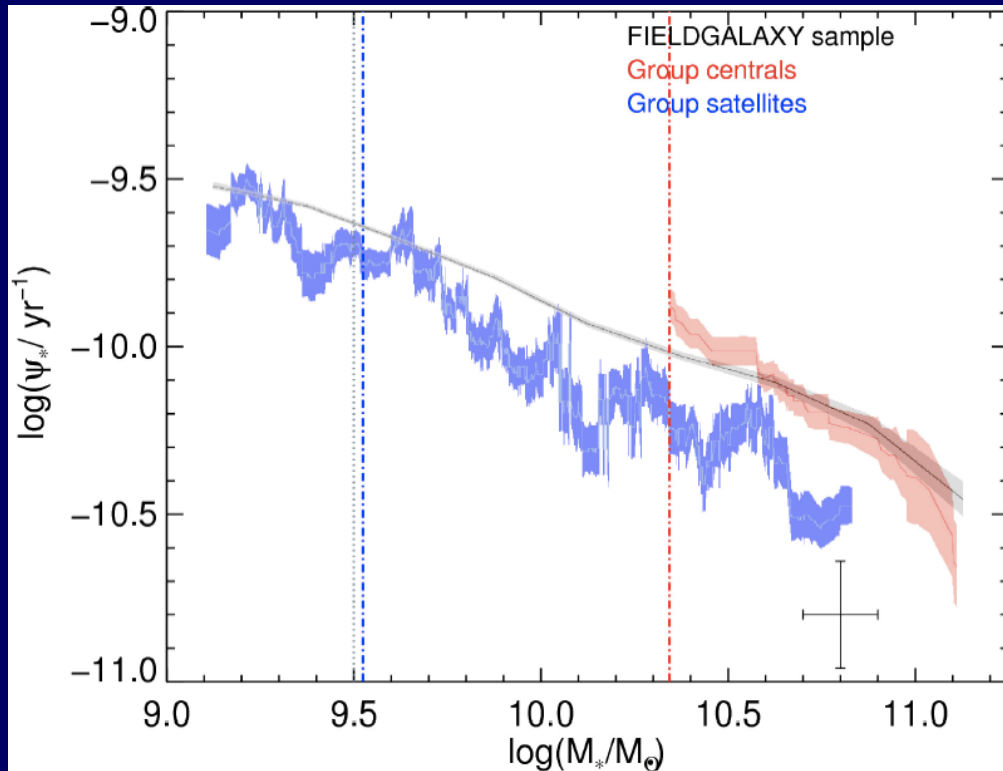


Dark matter
(simulations by
Springel et al. 2006)



Dolag et al. (2006)

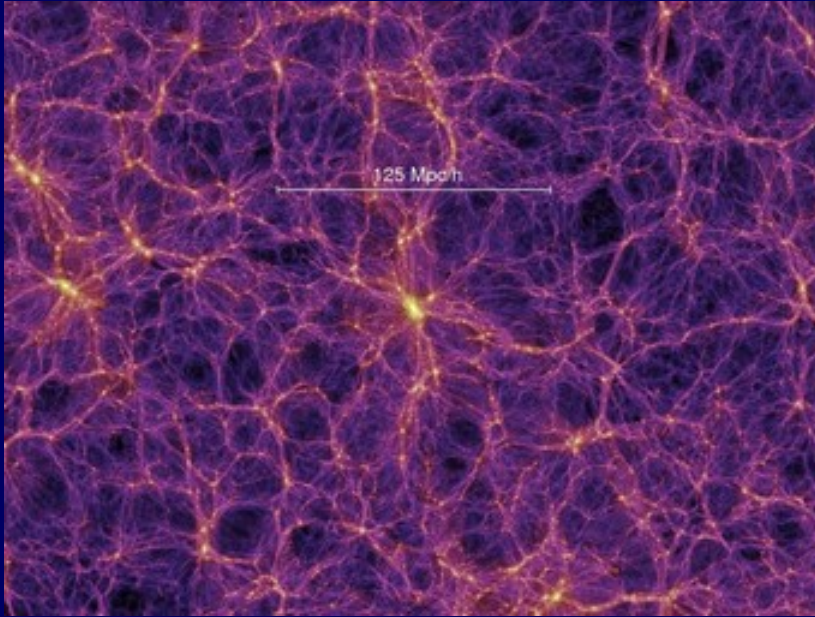
Main sequence relation for a sample of 7000 GAMA spirals



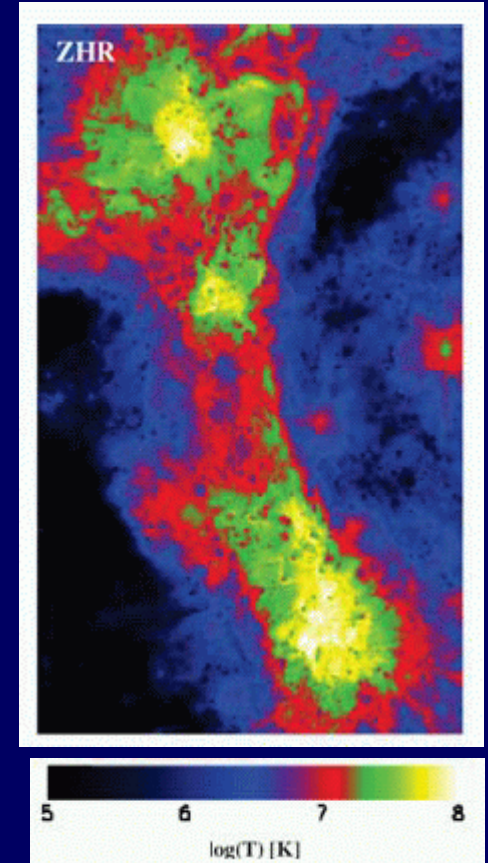
- with morphological classification
- $z < 0.13$
- DM halos $> 10^{12} M_\odot$ isolated and group spirals

Grootes, Tuffs, Popescu et al (2016)

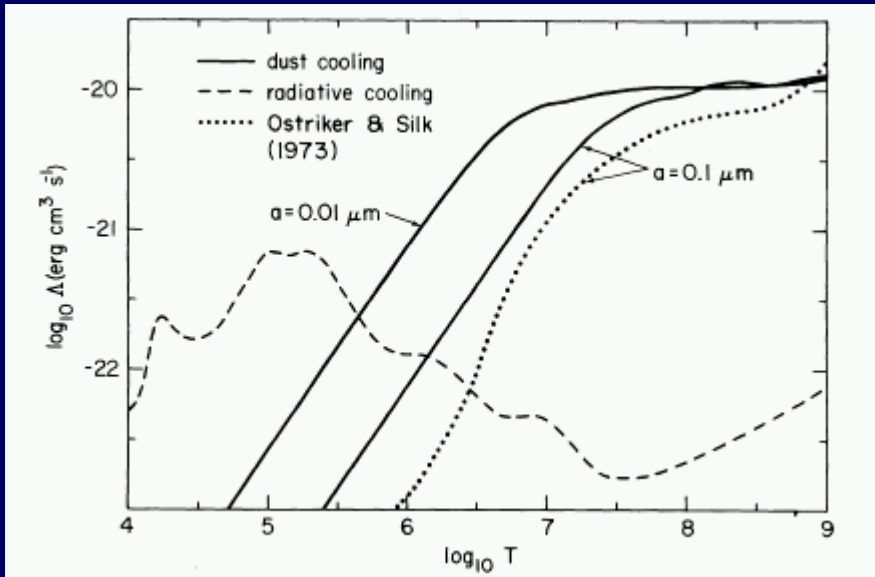
Cooling of the warm-hot intergalactic medium through dust



Dark matter
(simulations by
Springel et al. 2006)



Dolag et al. (2006)



Dwek & Werner (1981)

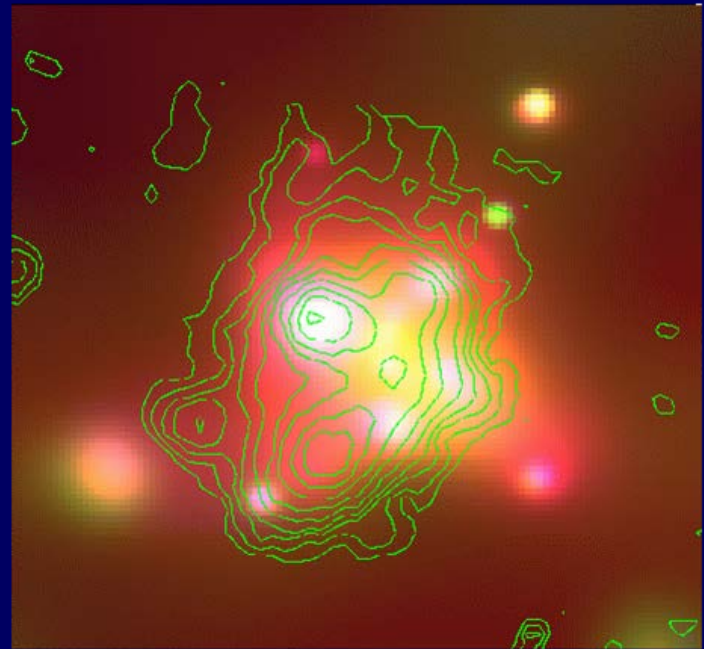
Dust/gas=0.006
Solar metallicity

- hot plasma cools primarily
in the FIR via inelastic
collisions with grains

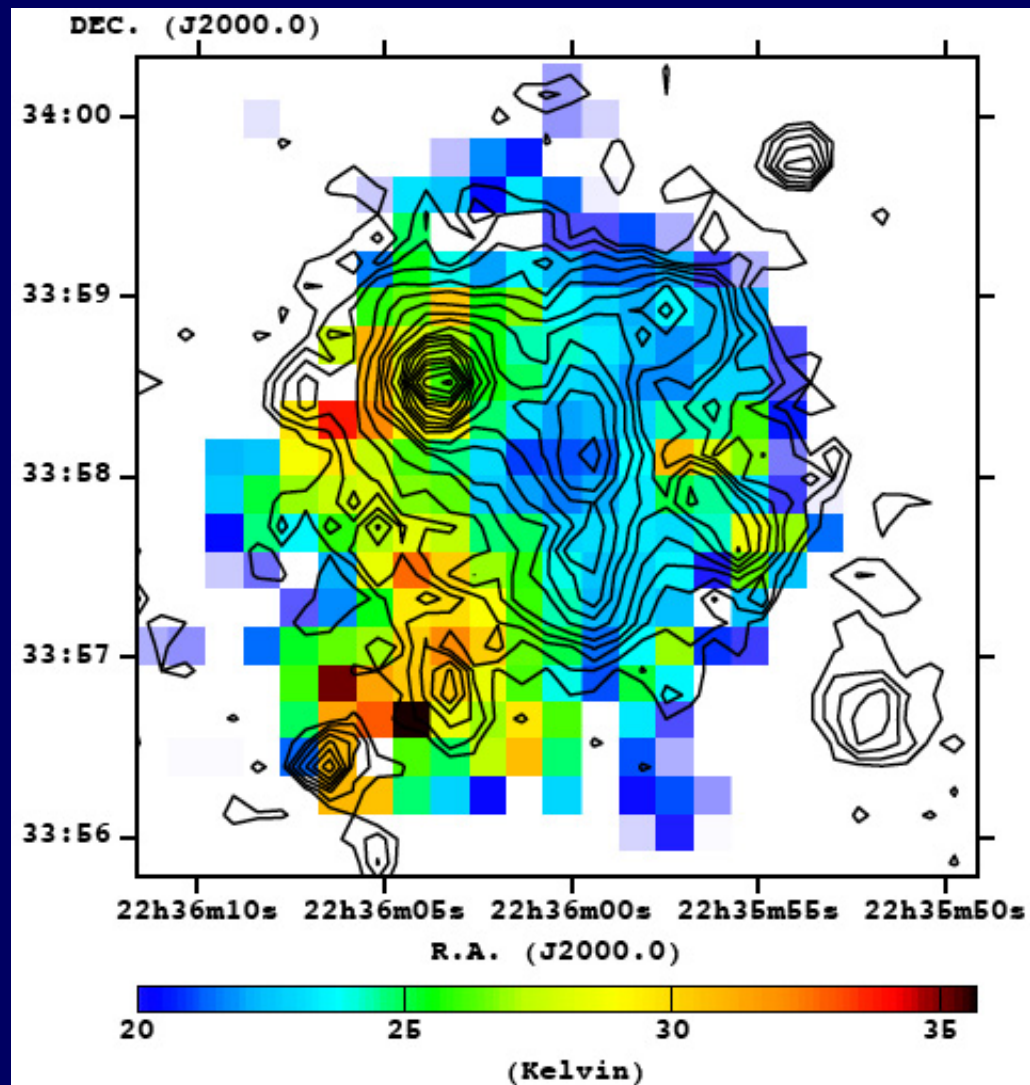
Viewing the condensation of the warm-hot IGM into galaxies

Detection of diffuse dust emission in the intergroup medium by Natale, Tuffs, Popescu et al. (2010)

- $(L(\text{FIR})/L(\text{Xray})) \sim 50$
- efficiency of cooling through dust due to presence of stellar sources of grains in the intergalactic medium
- local universe analogue of feedback processes in early universe

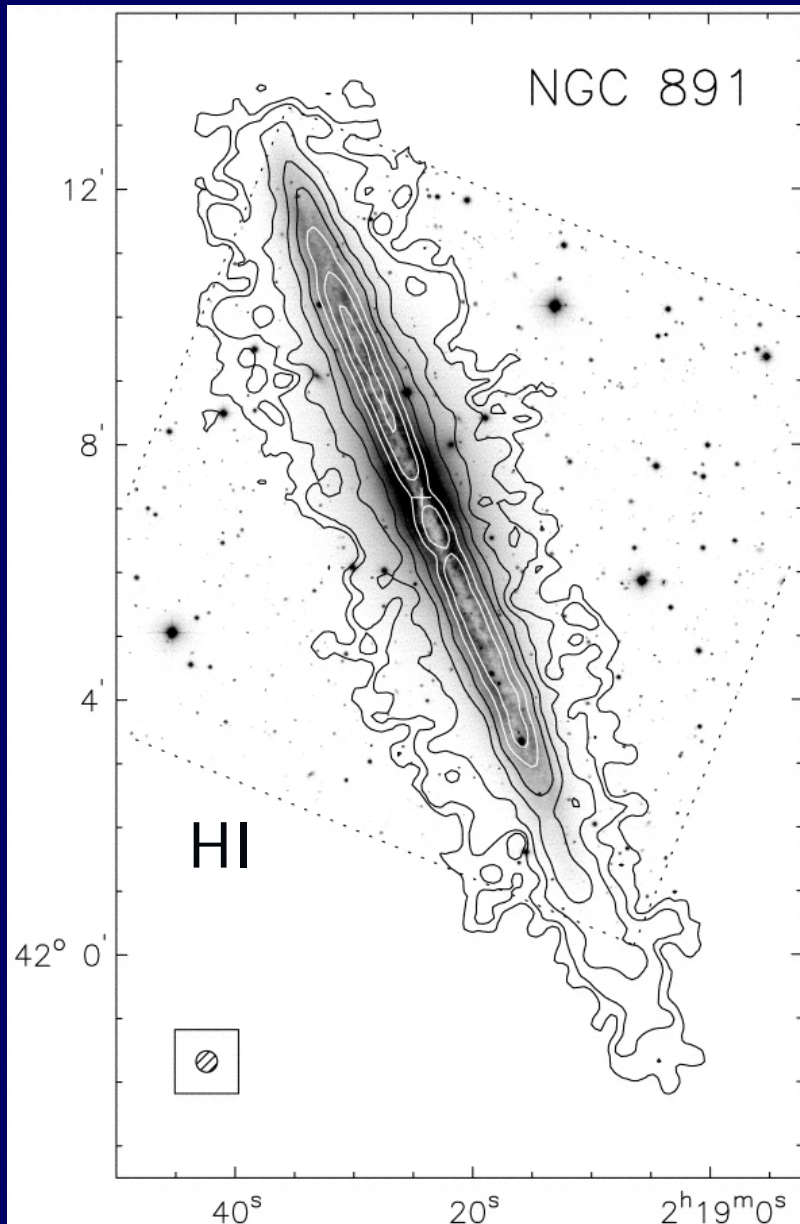


Spitzer image of Stephan's Quintet
(160 micron contours overlaid on X-ray image)



Detection of intergalactic FIR emission confirmed with AKARI by Suzuki et al. (2011)

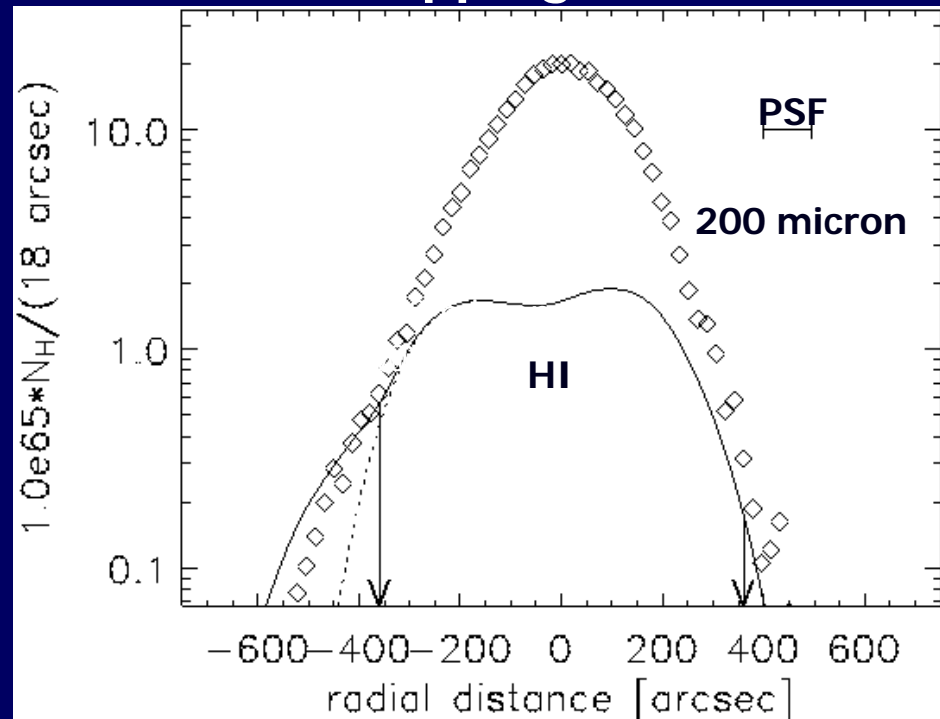
How are galaxies connected to the Cosmic Web?



Swaters et al. (1997)

First detection of FIR emission from an extended HI disk

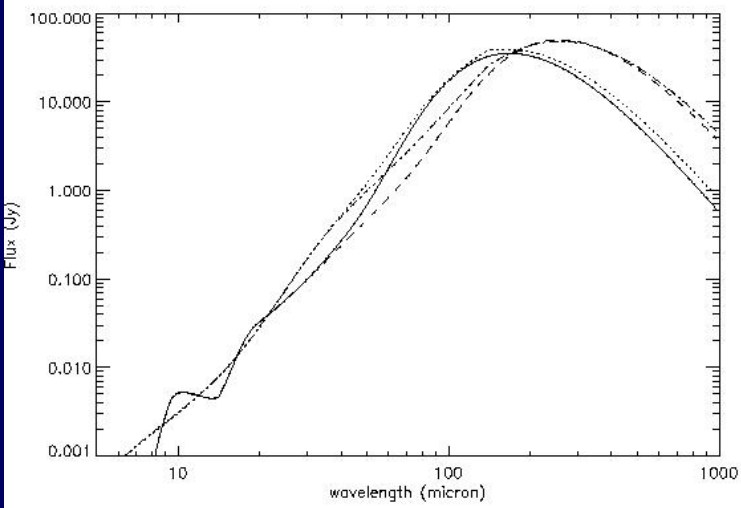
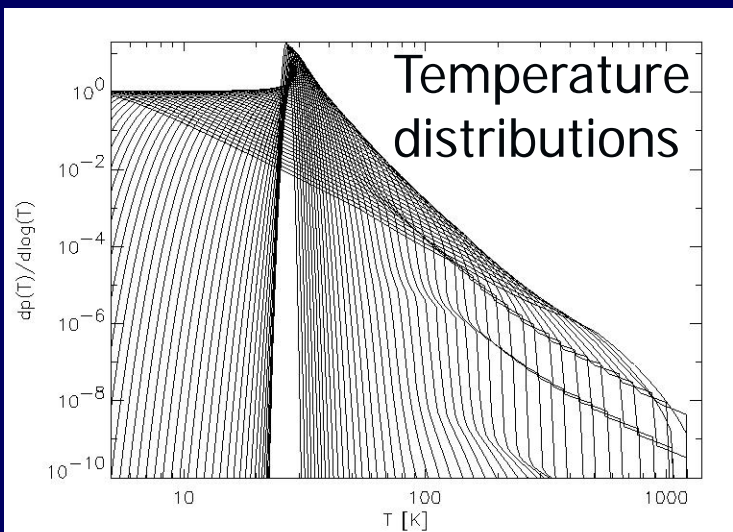
ISOPHOT mapping of NGC 891



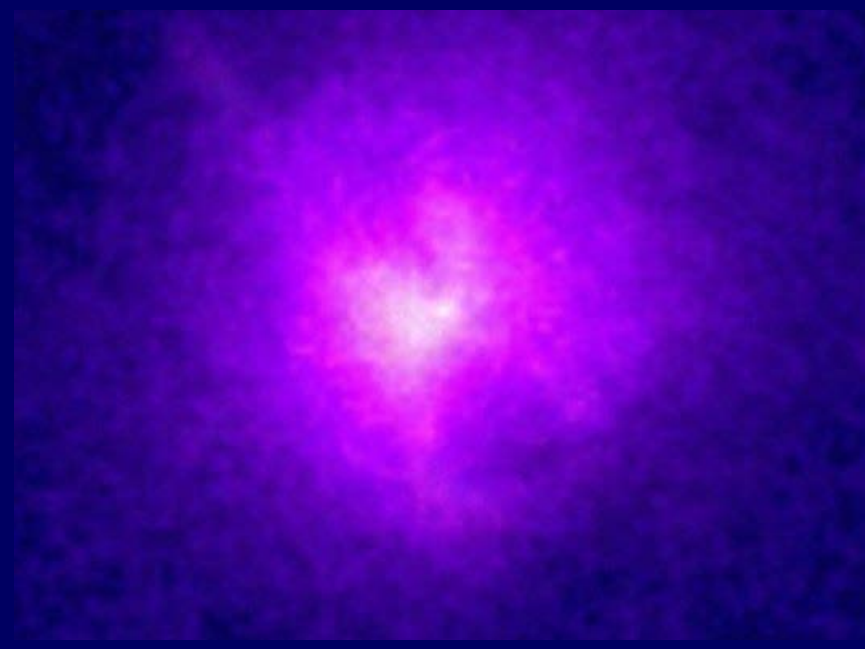
Popescu & Tuffs (2003)

Extended HI disk is not primordial

Measuring the dust content of the IGM

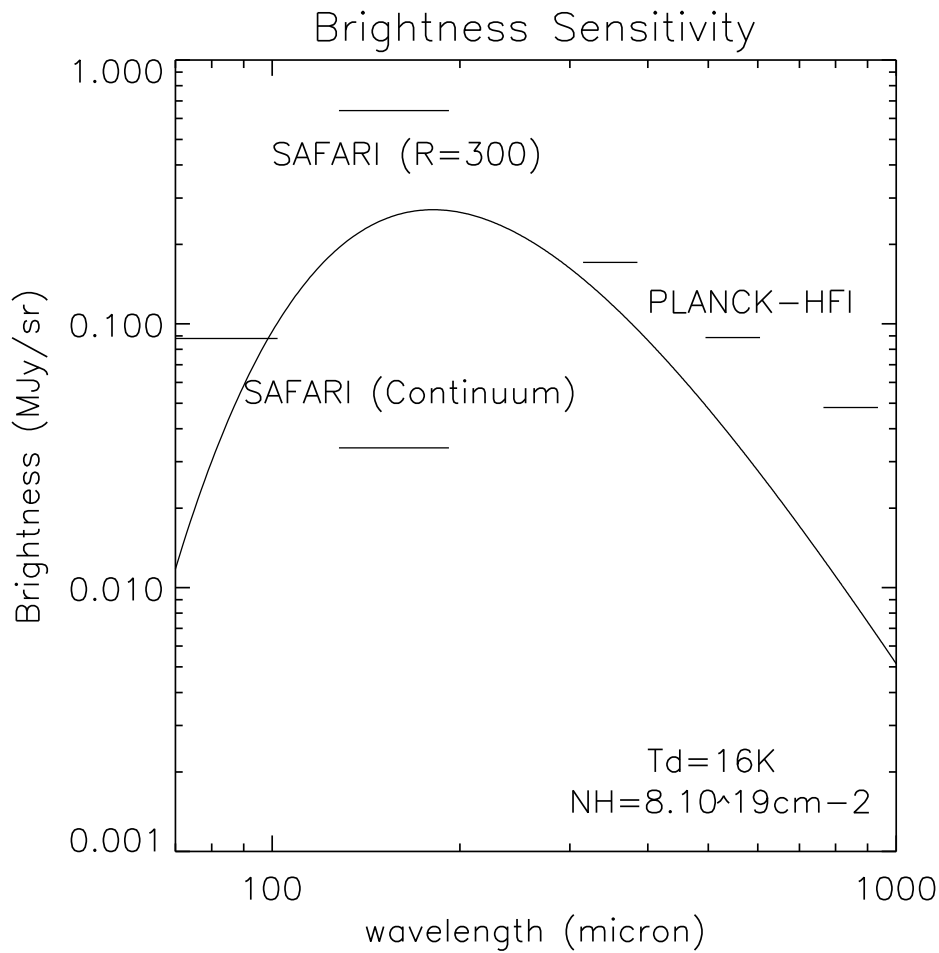


Popescu et al. (2000)



Chandra image of Hydra A

Prediction for the integrated flux density of a cluster due to grains in the IGM infalling into a cluster.



- $3 \cdot 10^9$ Msolar
- half solar metallicity
- dust/gas=0.005
- 50x50 kpc

5-sigma 1 hour in a field of 1 arcmin^2 corresponds to $50 \text{ kpc} \times 50 \text{ kpc}$ at $z=0.1$

Summary: SPICA/SAFARI's surface brightness sensitivity in the far-infrared will:

- provide a view of the baryonic (gaseous) component of the cosmic web
- establish how the gas in galaxies is connected to the gas in the cosmic web
- provide a definitive measurement of the dust content and opacity of the intergalactic medium
- establish the propensity of galaxies to form out of the cosmic web and the relation between luminous and dark matter in the web