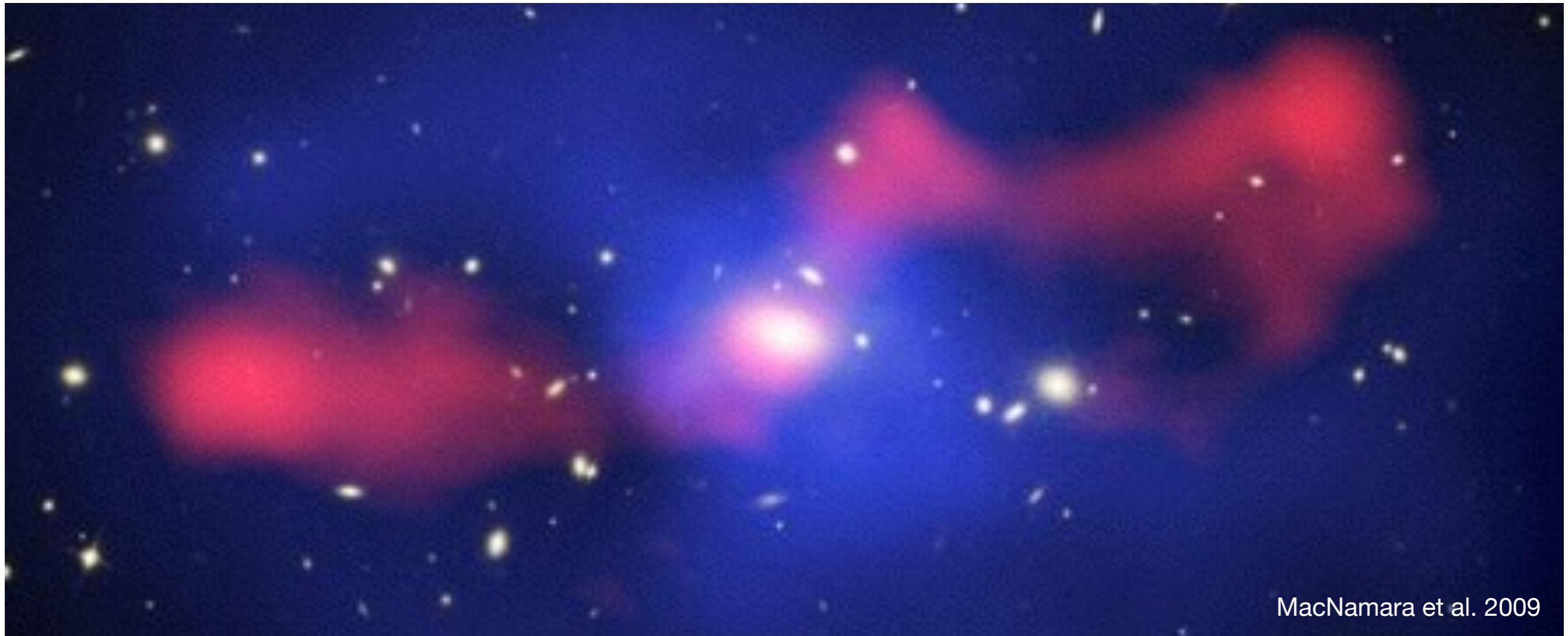


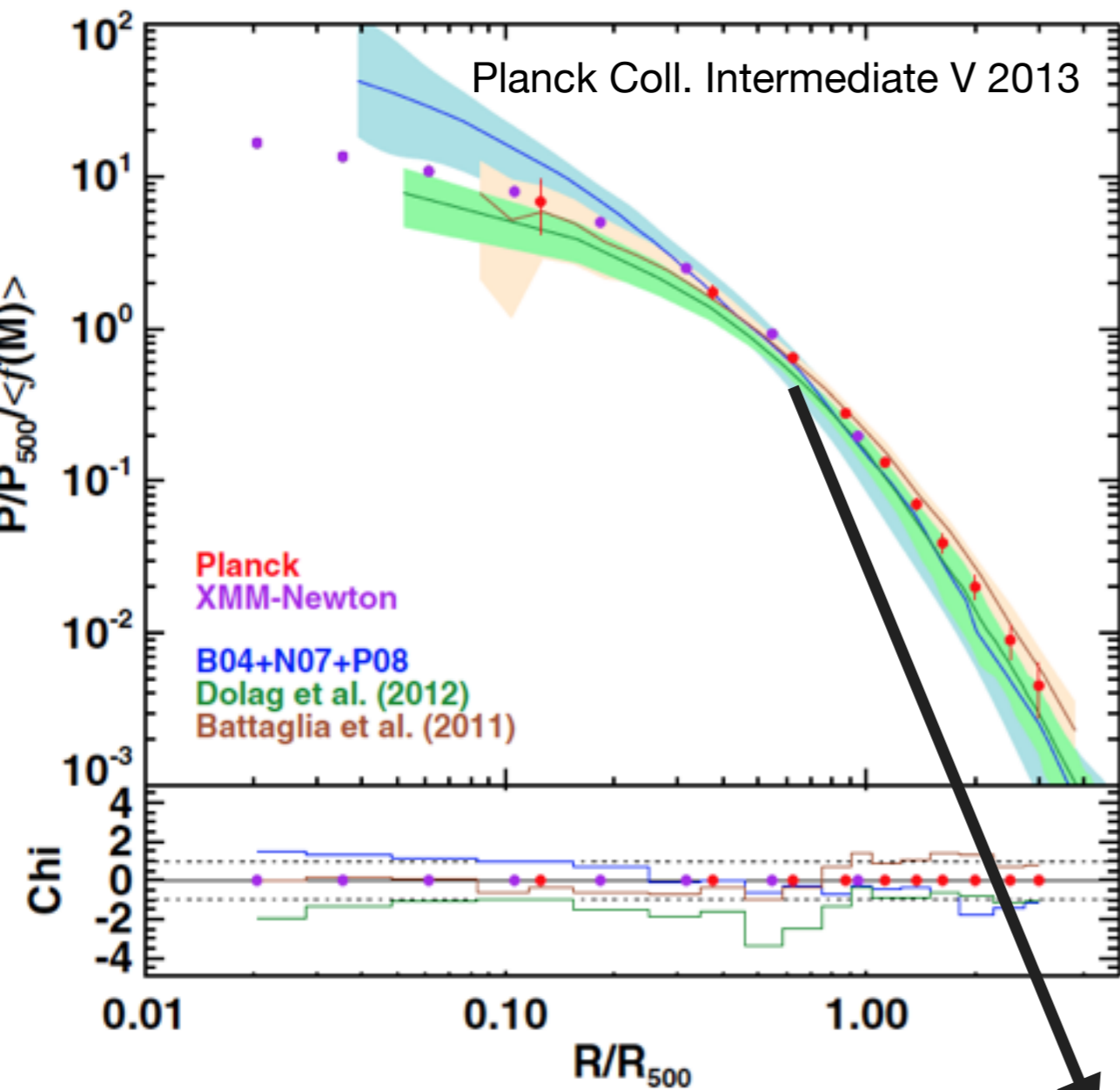
cluster astro case from tSZ+kSZ



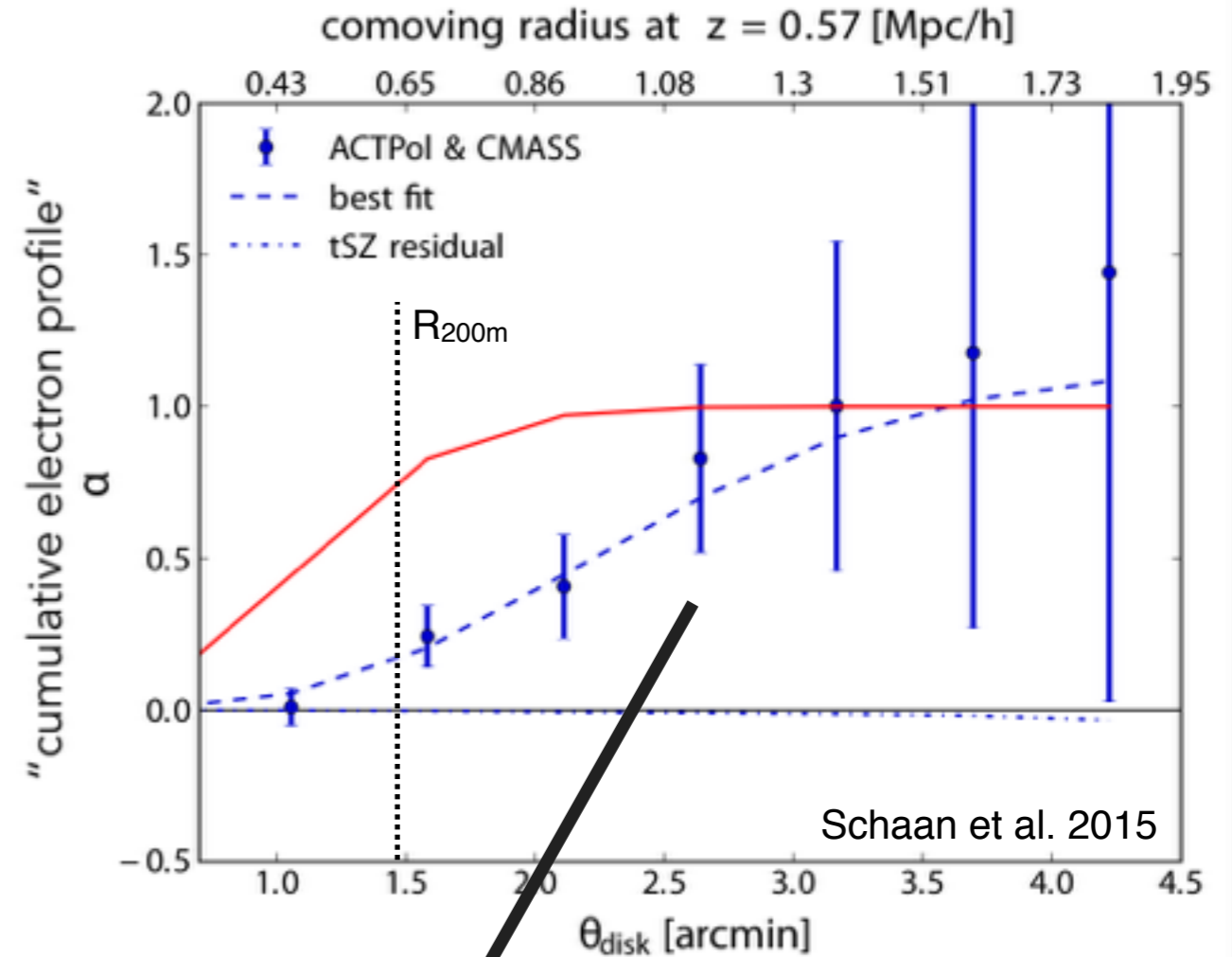
Nick Battaglia

with Simone Ferraro, Emmanuel Schaan, & Neelima Sehgal (David Spergel)

Combining SZ observations



+



Given $P_{\text{th}}(r)$ and $\rho(r)$ from these measurements
Can we constrain astrophysical properties?
Feedback, non-thermal pressure support etc.

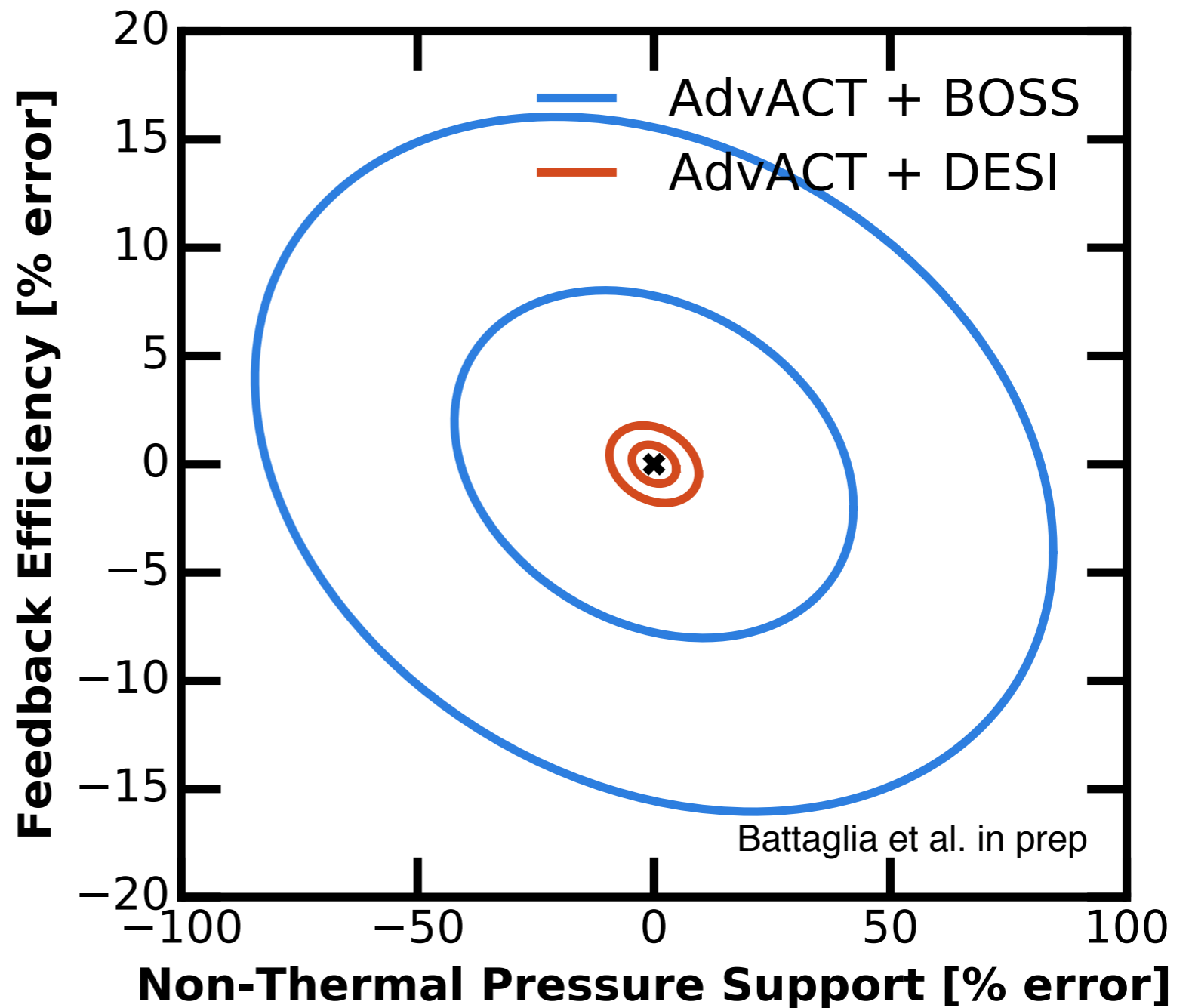
Constraints

Forecasts include:
 non-white noise, CMB, CIB
 (poisson and clustered),
 Radio sources
 (see Simone's talk)

These parameters have not
 been constrained

For non-parametric
 constraints consider the
 S/N of the profile as the
 metric

BOSS to DESI 80x more
 galaxies = 9x more S/N

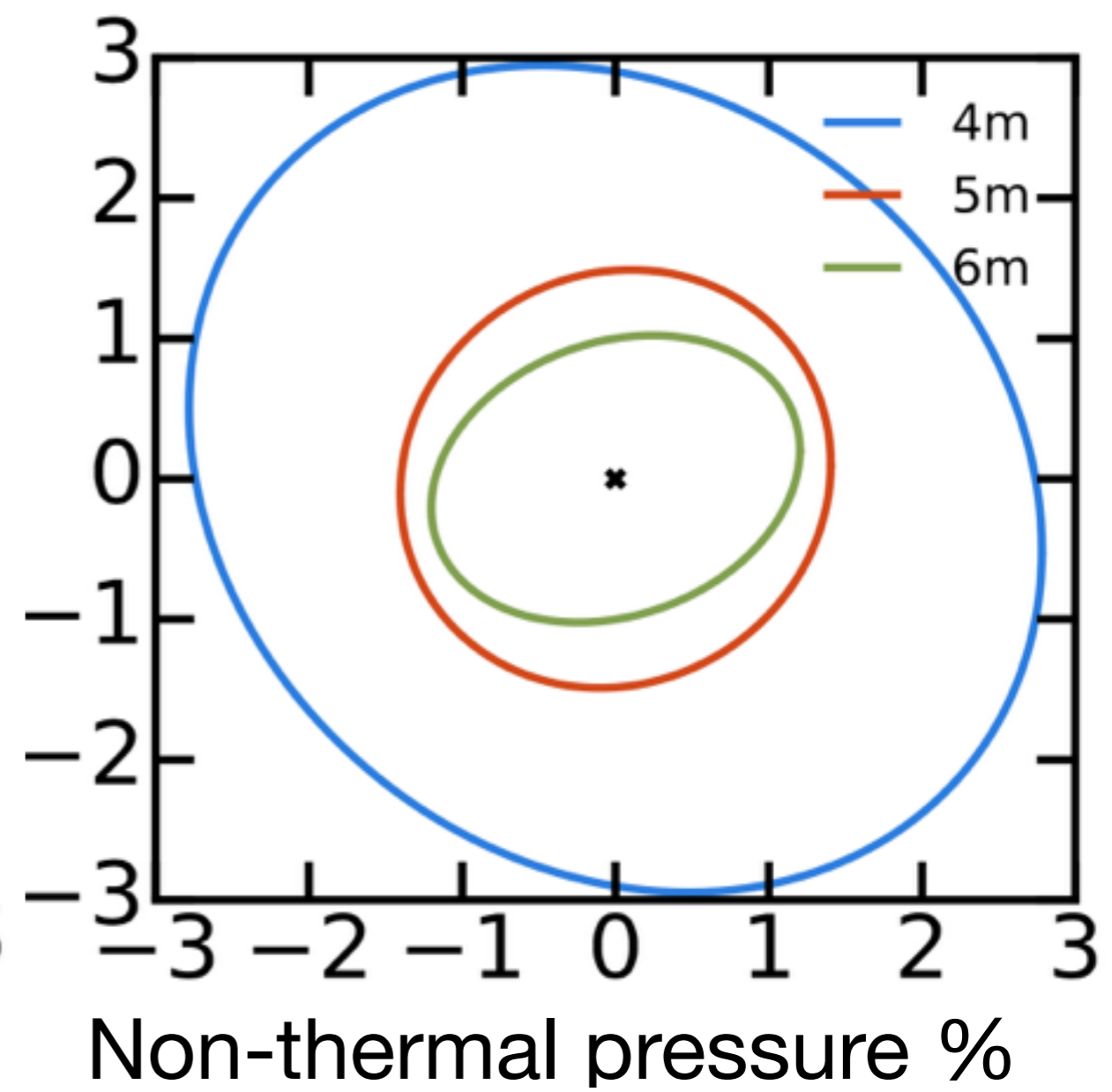
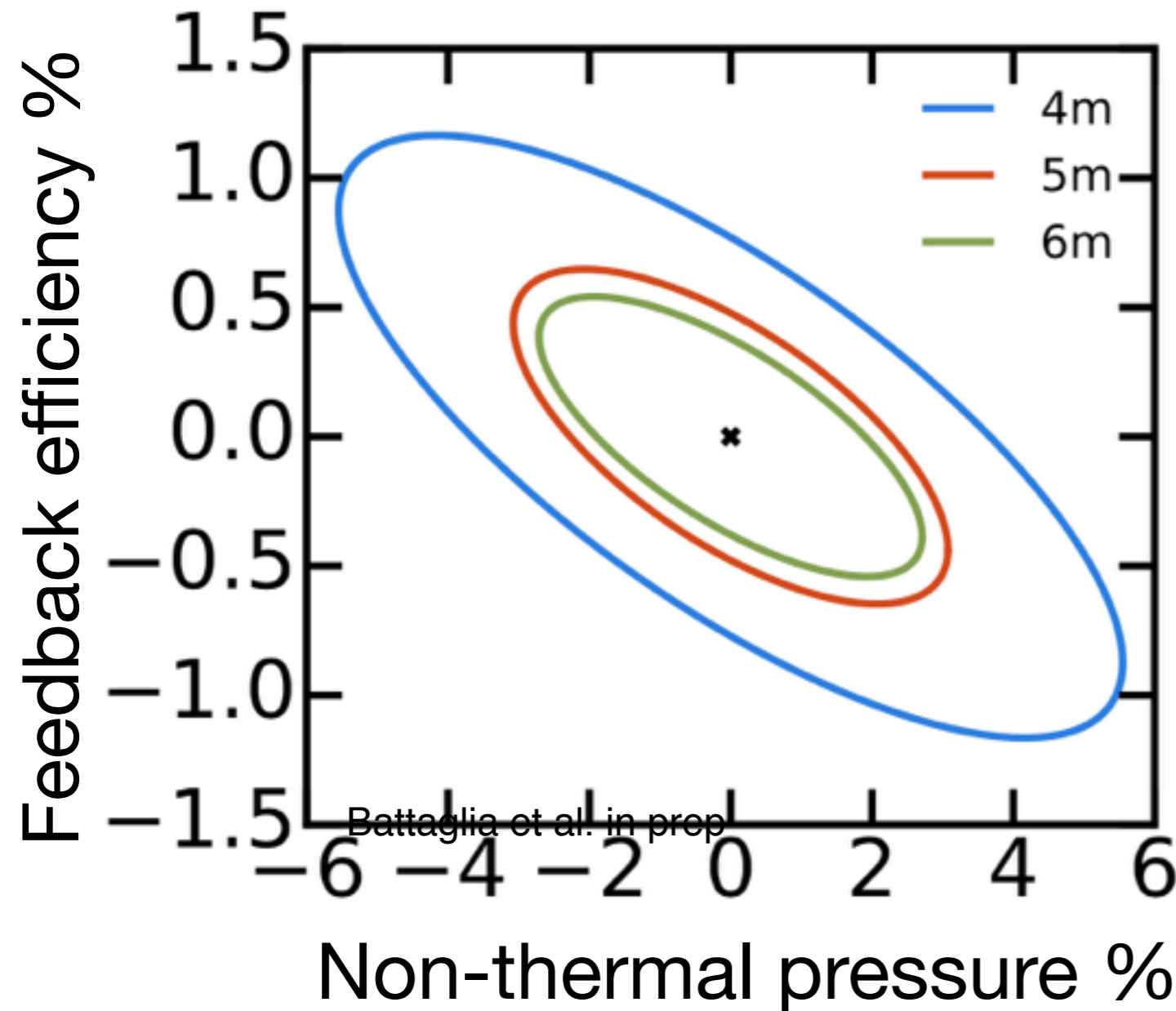


		AdvACT		CMB-S4		
		BOSS	DESI	4m + DESI	5m + DESI	6m + DESI
CMASS	kSZ	24	219	233	331	379
	tSZ	43	389	413	605	707
Hiz	kSZ	23	211	226	326	379
	tSZ	42	384	409	610	727

Constraints

CMASS-like

Higher z, lower mass



Almost factors
of 2 in S/N

		AdvACT		CMB-S4		
		BOSS	DESI	4m + DESI	5m + DESI	6m + DESI
CMASS	kSZ	24	219	233	331	379
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Summary

Combined stacked SZ measurements will place constraints on feedback and non-thermal pressure support (currently poorly constrained)

Sub-sample halo populations (redshift, galaxy type, etc)

Large gains in S/N going from 4-6m (non-parametric approach)

Science requirements - sub-% constraints on feedback, % non-thermal

In progress

Do higher frequencies from the ground help (CCAT-p)?

Include in future $p(k)$ modeling of the non-linear regime

Experiment requirements

Minimum dish size is 5m for cutting edge constraints 10% gains going to larger telescopes

Spectroscopic surveys are required to obtain redshifts but we can explore this further with other kSZ estimators (projected fields Hill++ 2016 & Ferraro++ 2017)