What's Next With Type Ia Supernovae

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Workshop on "The Future of H0: Crisis or Concordance?"

This is what real tension looks like.

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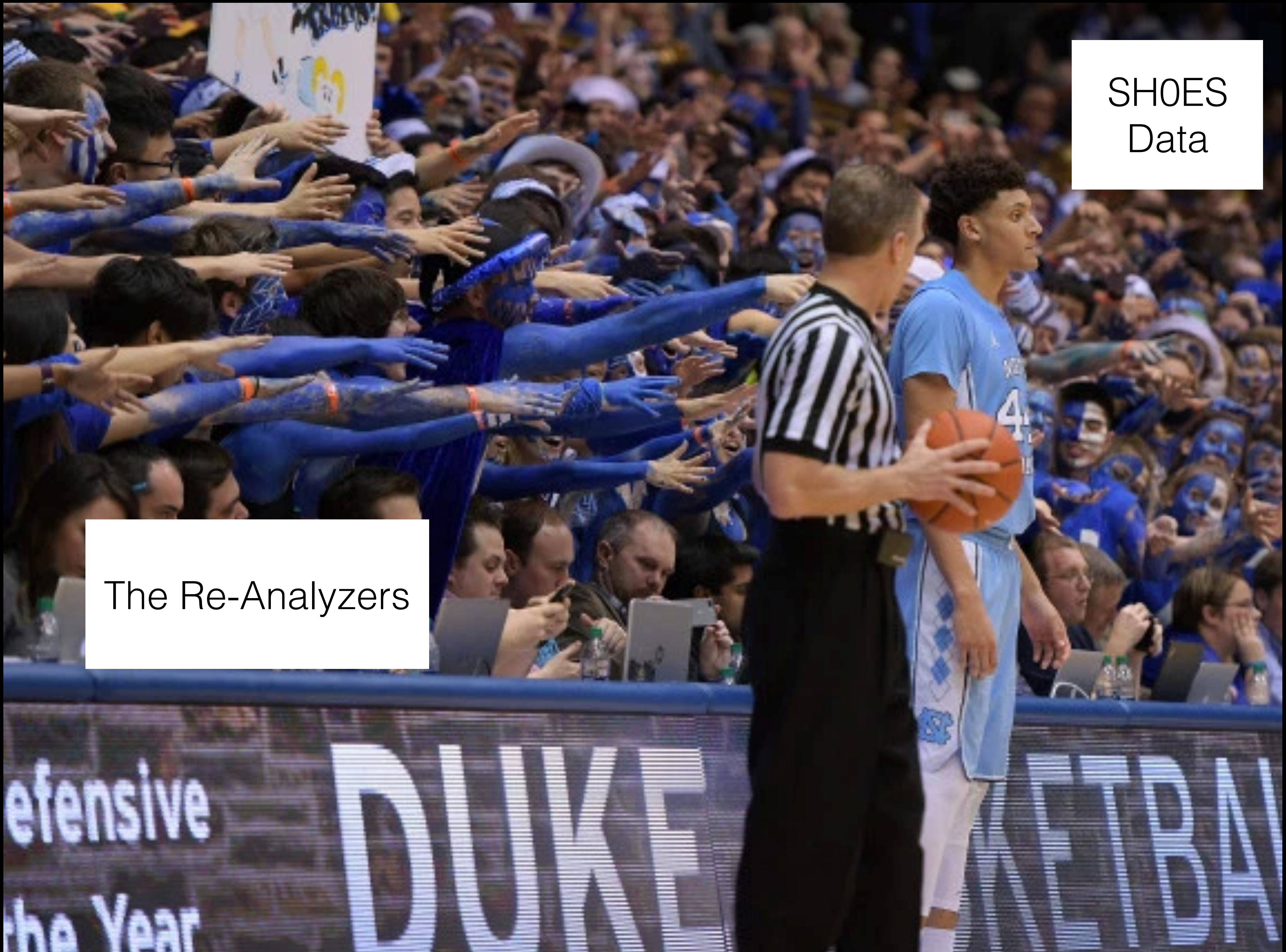
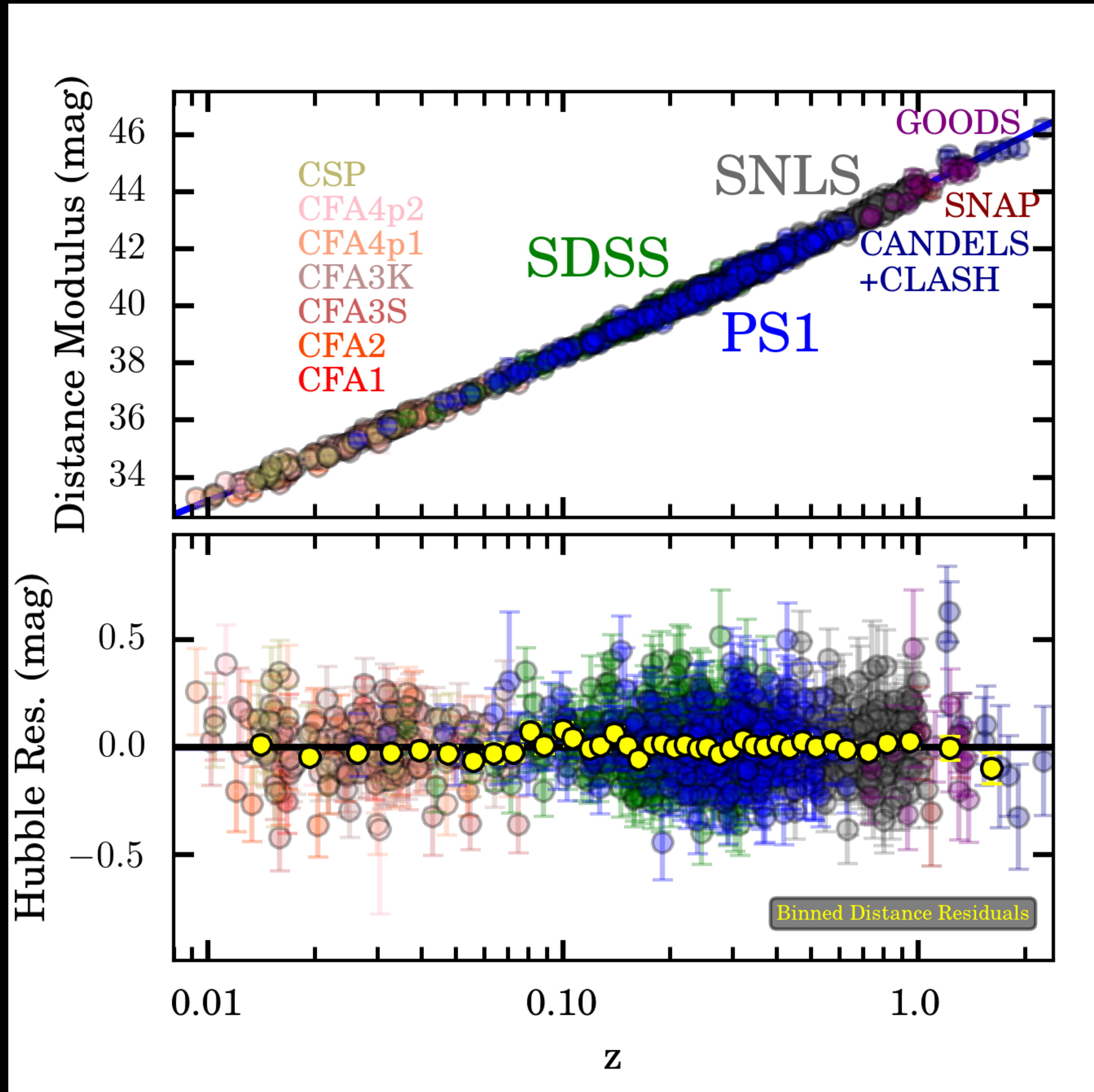


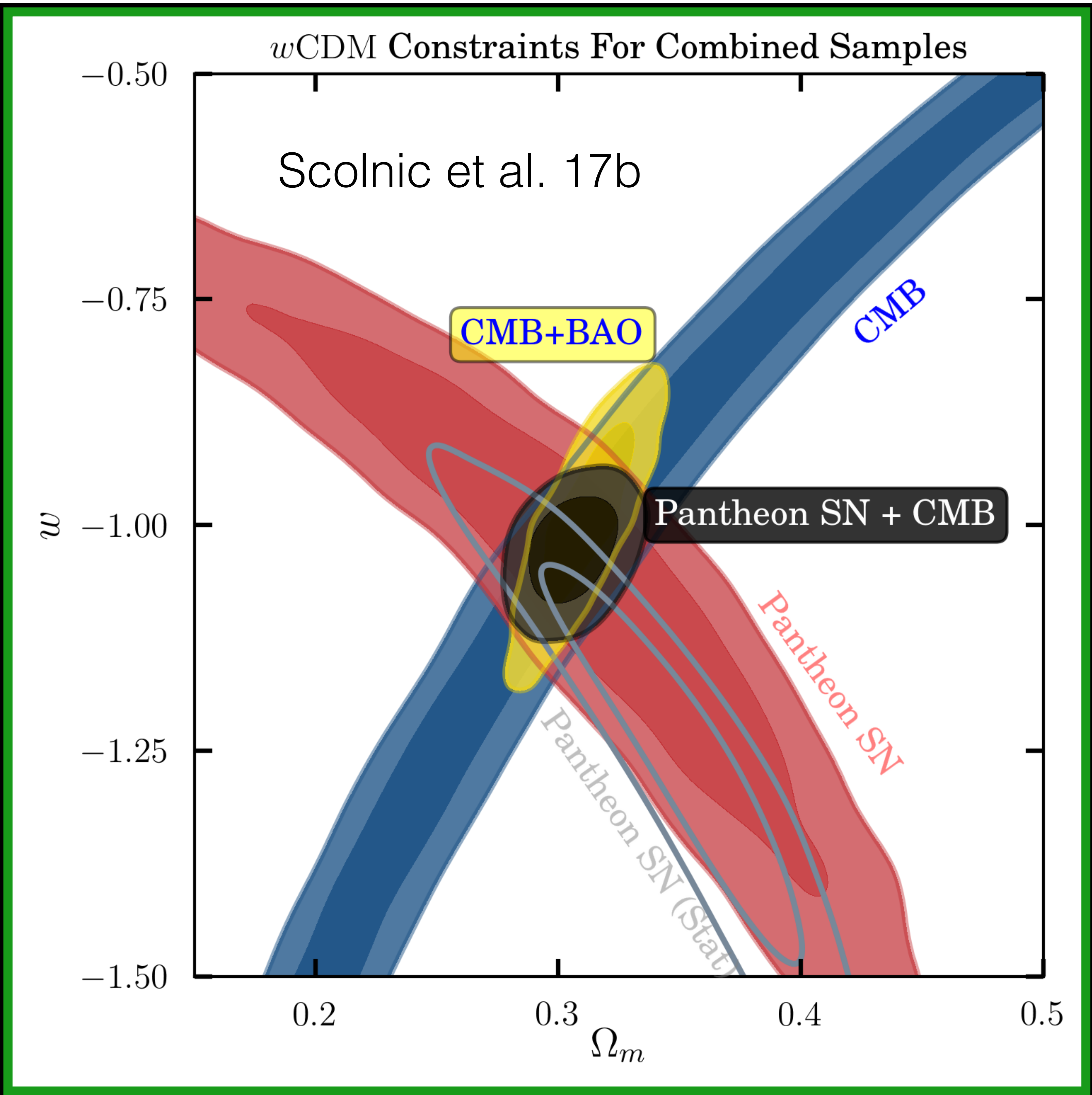
The Pantheon Sample - Scolnic et al. 2018 is out.
Can find it online, in COSMOMC, COSMOSIS..

Analyzed 1,050 SNIa [PS1+Low-z +SNLS+SDSS +HST] from z=0.01 to z=2.3

Biggest SN sample to date and first homogeneously calibrated sample



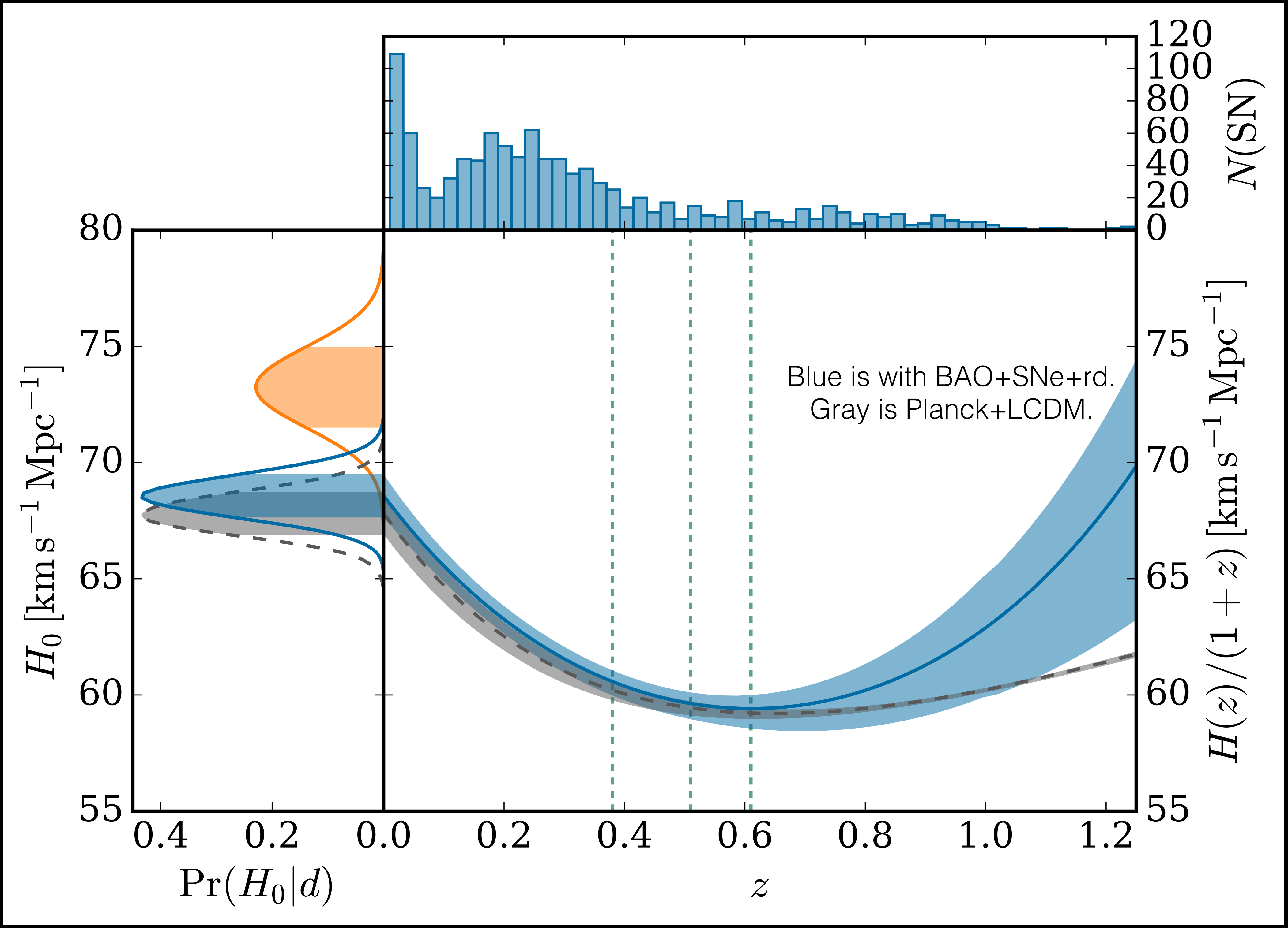
Pantheon analysis placed tightest constraint on dark energy to date.



w=-1.026 +-0.041

PS1 Phot Sample [Jones, Scolnic et al. 17], DES Spec Sample [in prep.] get very similar results

New analyses are combining Pantheon with BAO and other combinations, find low H0.



Feeney et al. 2018

These SNe ~same as SNe used in R16 measurement!

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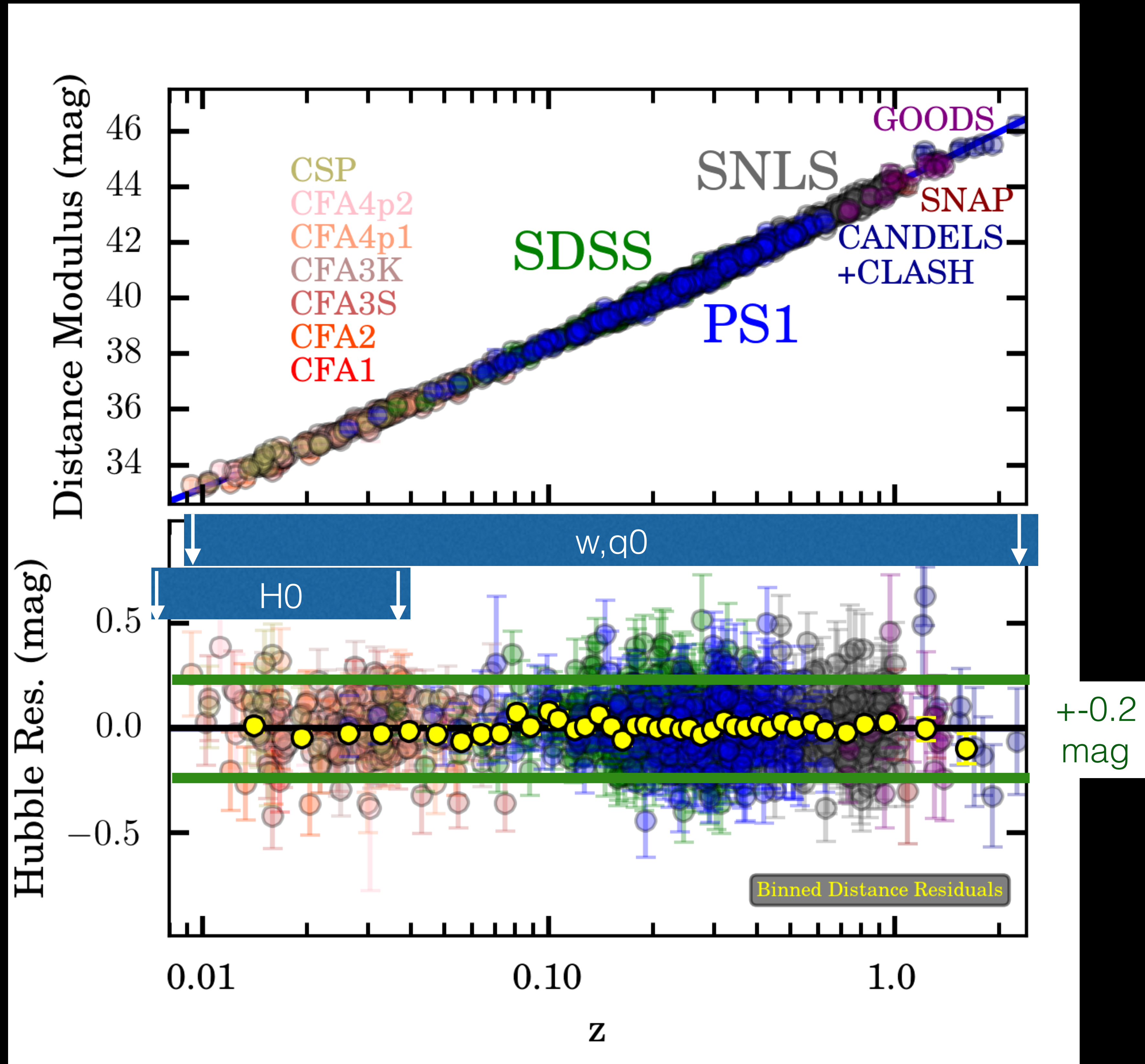
For w: Care about 1% difference between z=0.05 and z=0.5

For H0: Care about 4% difference between z=0.005 and z=0.05



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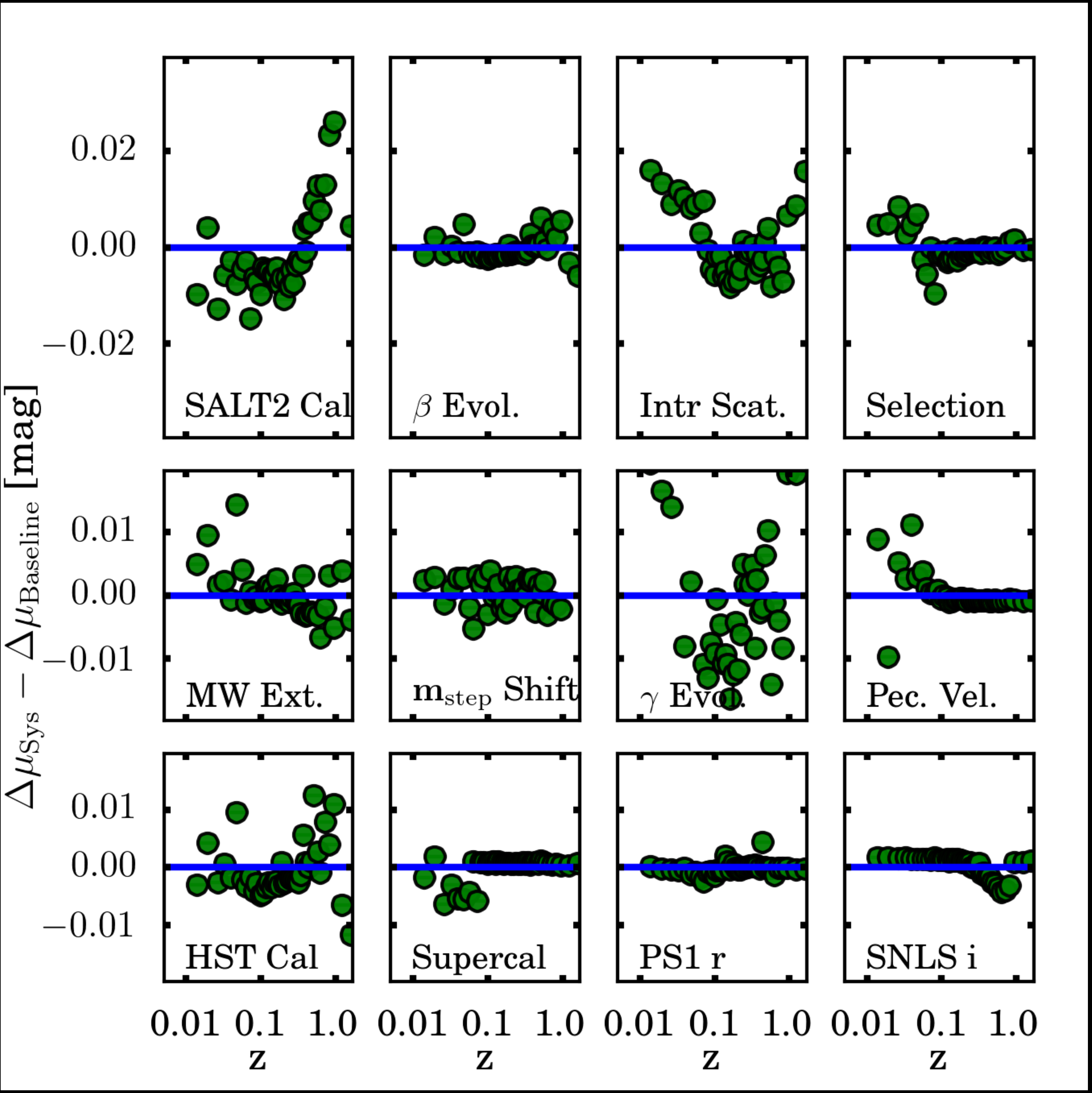
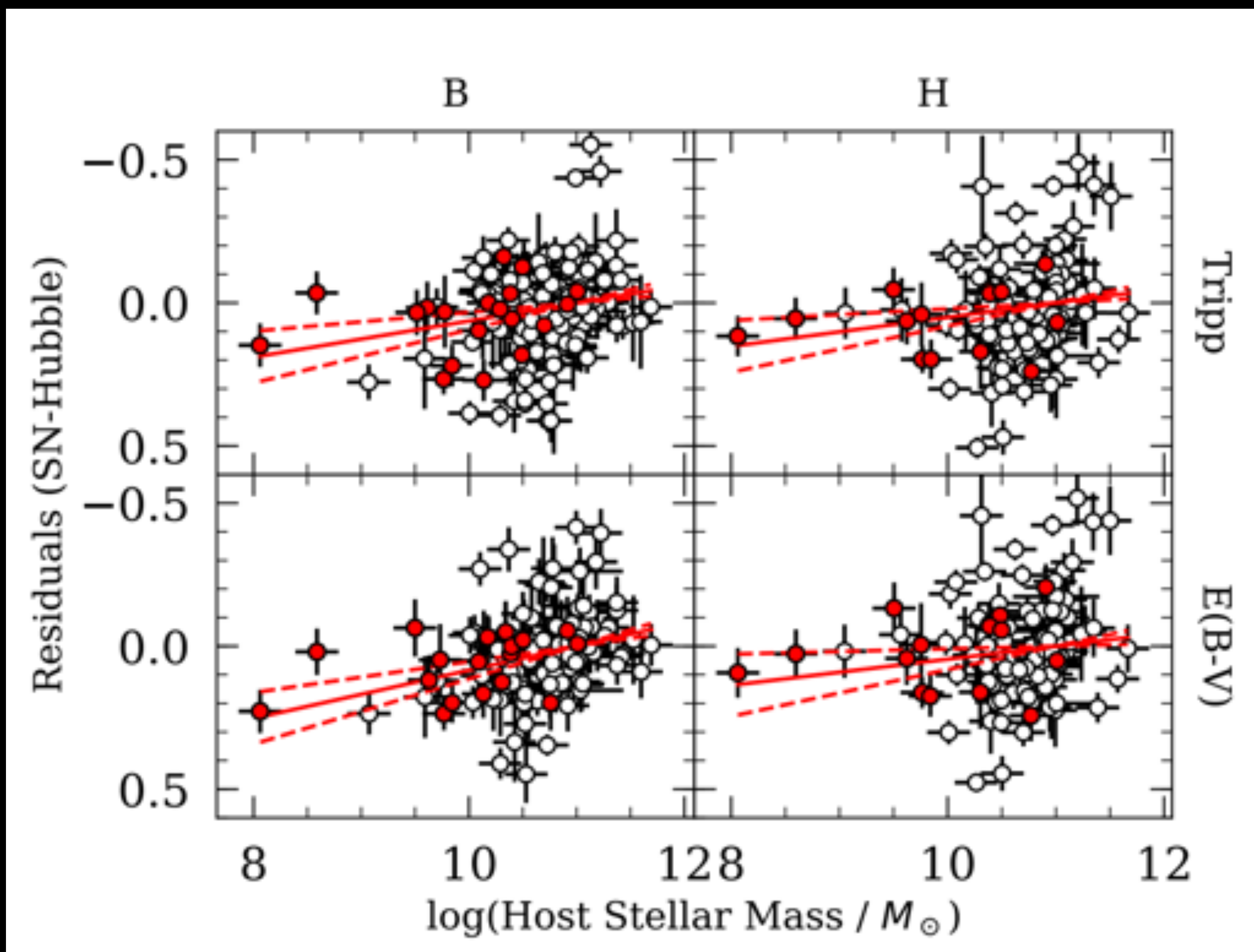
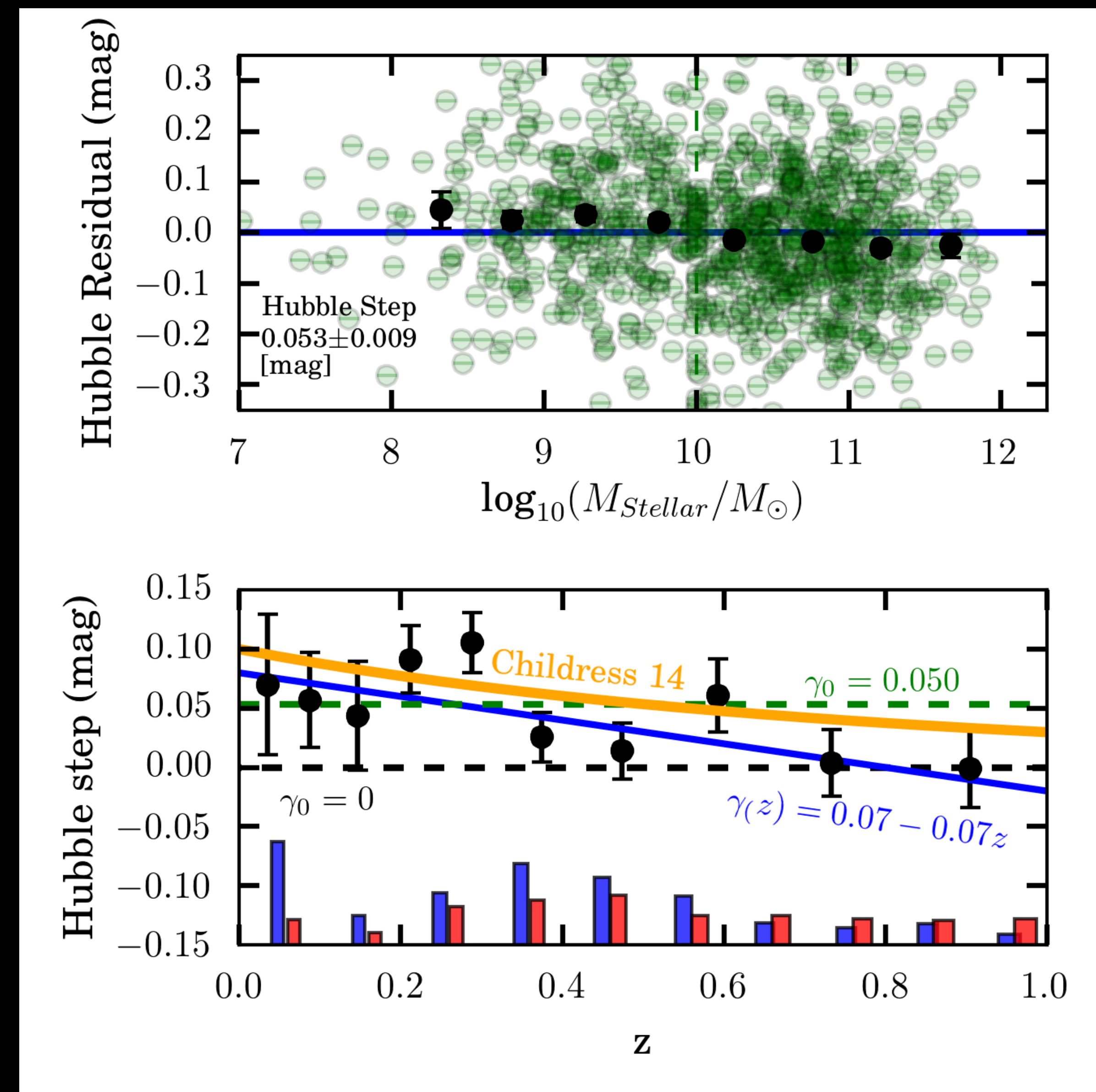
When Pantheon is binned down, one is going to see 'curiosities', but a lot of these are systematics.



A correlation between Host Galaxy and Hubble Residuals is one of those systematics, but is better constrained with more data.



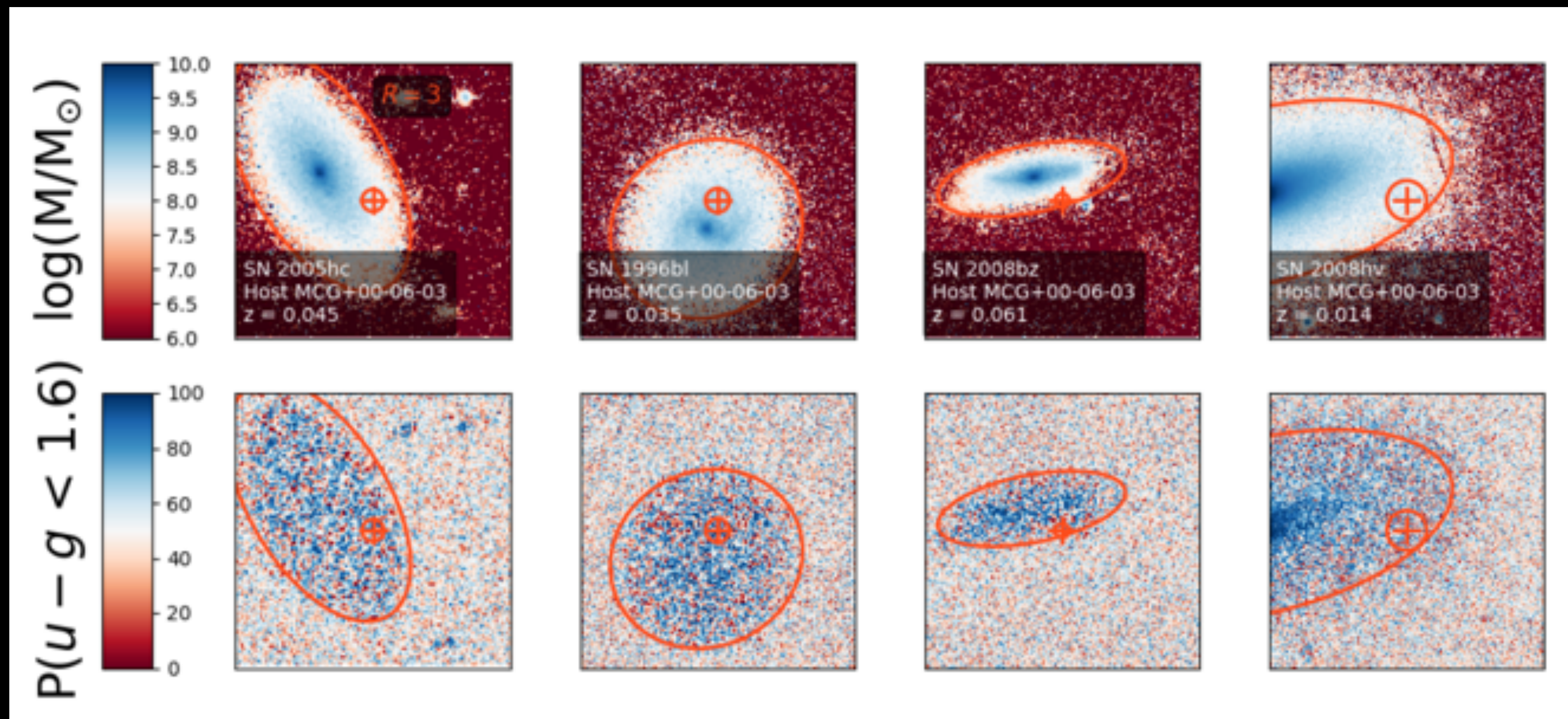
CSP - Burns et al. 2018



Pantheon

CSP - mass correction can be as large as 0.2 mag,Pantheon 0.03 on either side.

For H0, we looked at different correlations of host properties and Hubble residuals, particularly focusing on ‘local’ properties of the host.



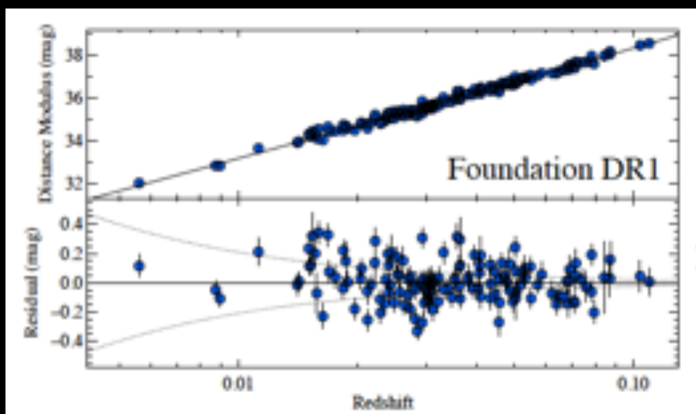
Jones, Riess & Scolnic et al. 2018

Table 4
Predicted Change in H_0 due to Mass and Color Steps

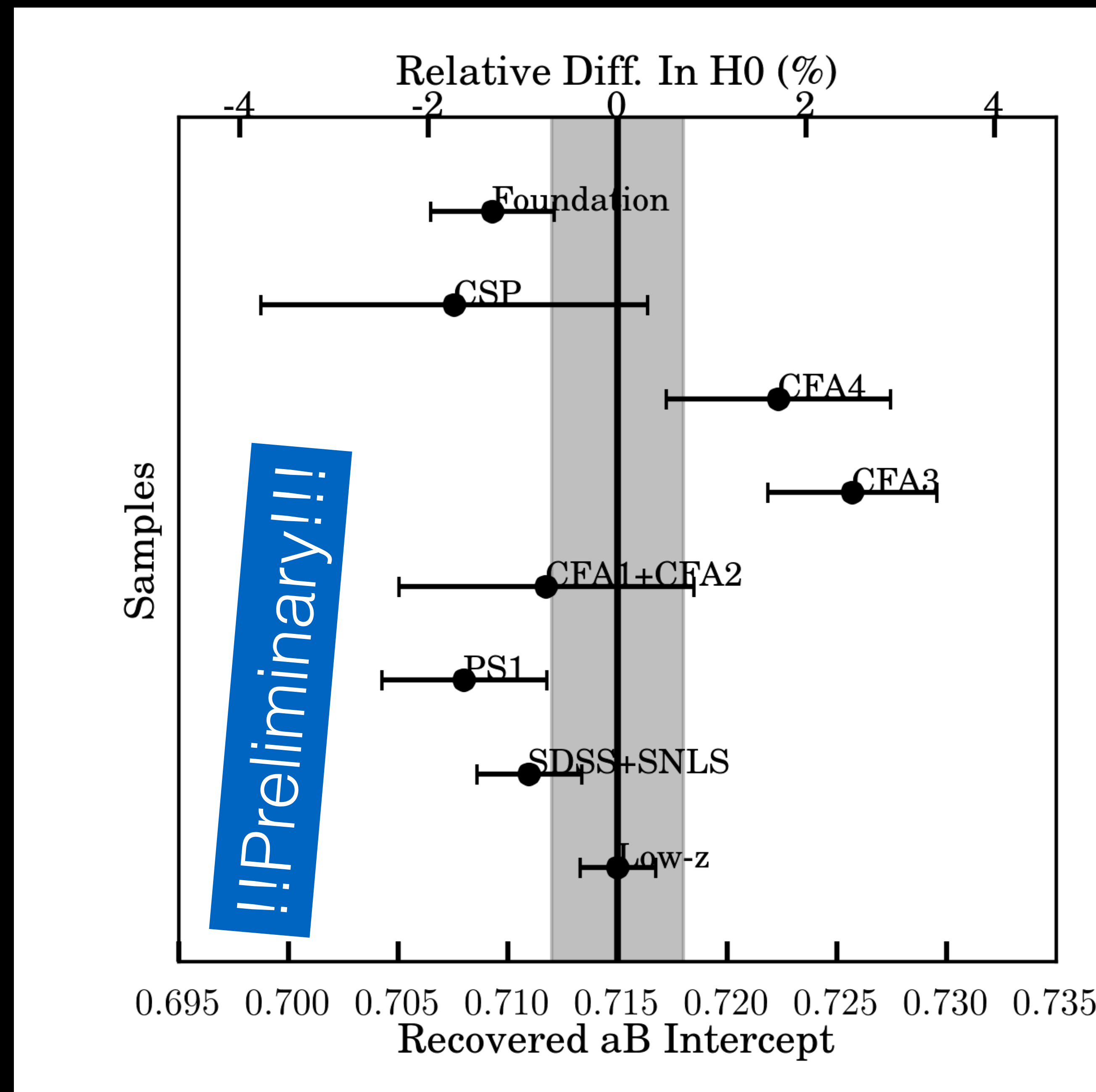
	Step Significance[a]	% in Cepheid Calibrators	% in Hubble Flow	ΔH_0 (km s^{-1} Mpc^{-1})
local mass > 8.9 dex	3.2σ	37.5	46.2	-0.16
global mass > 10 dex	0.5σ	50.0	72.2	0.08
local $u - g > 1.6$	1.1σ	6.2	47.7	-0.32
global $u - g > 1.6$	1.5σ	12.5	48.0	-0.35

Note. — We show the effect of applying a local step after correcting for a 0.06 mag mass step following (Riess et al. 2018). Note that the “global mass” correction increases H_0, as we measure a slightly smaller mass step of 0.05 mag in this work.
[a] Significance of the step after 0.06 mag correction based on global mass.

There is an ongoing Foundation Survey which uses the Pan-STARRS telescope to follow-up low redshift SNe



Foley, Scolnic, Rest et al. 2018

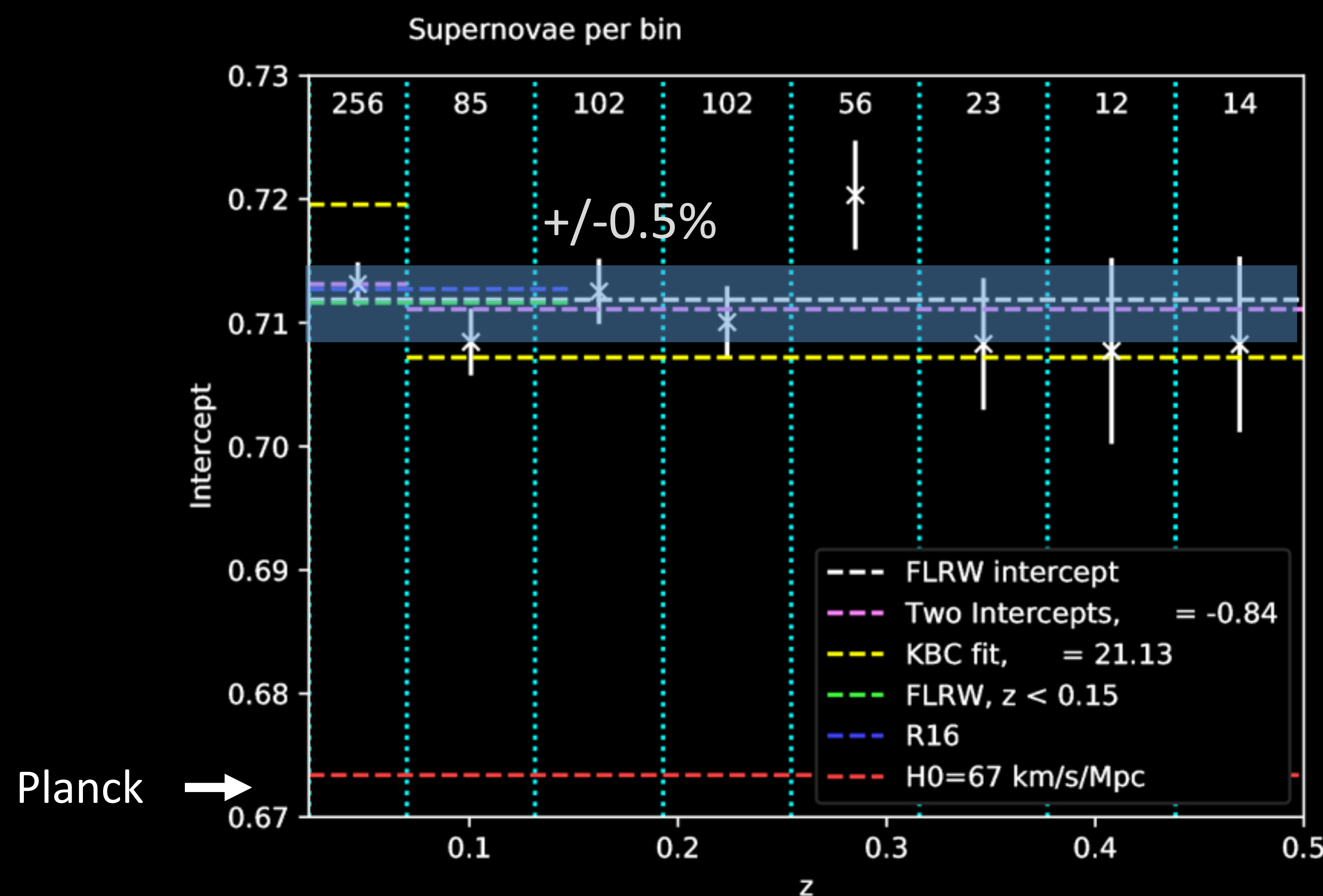


Scolnic et al. 2018 in prep.

First data release has more useful low-z SNIa than full previous sample. Just hit 300 SNIa!

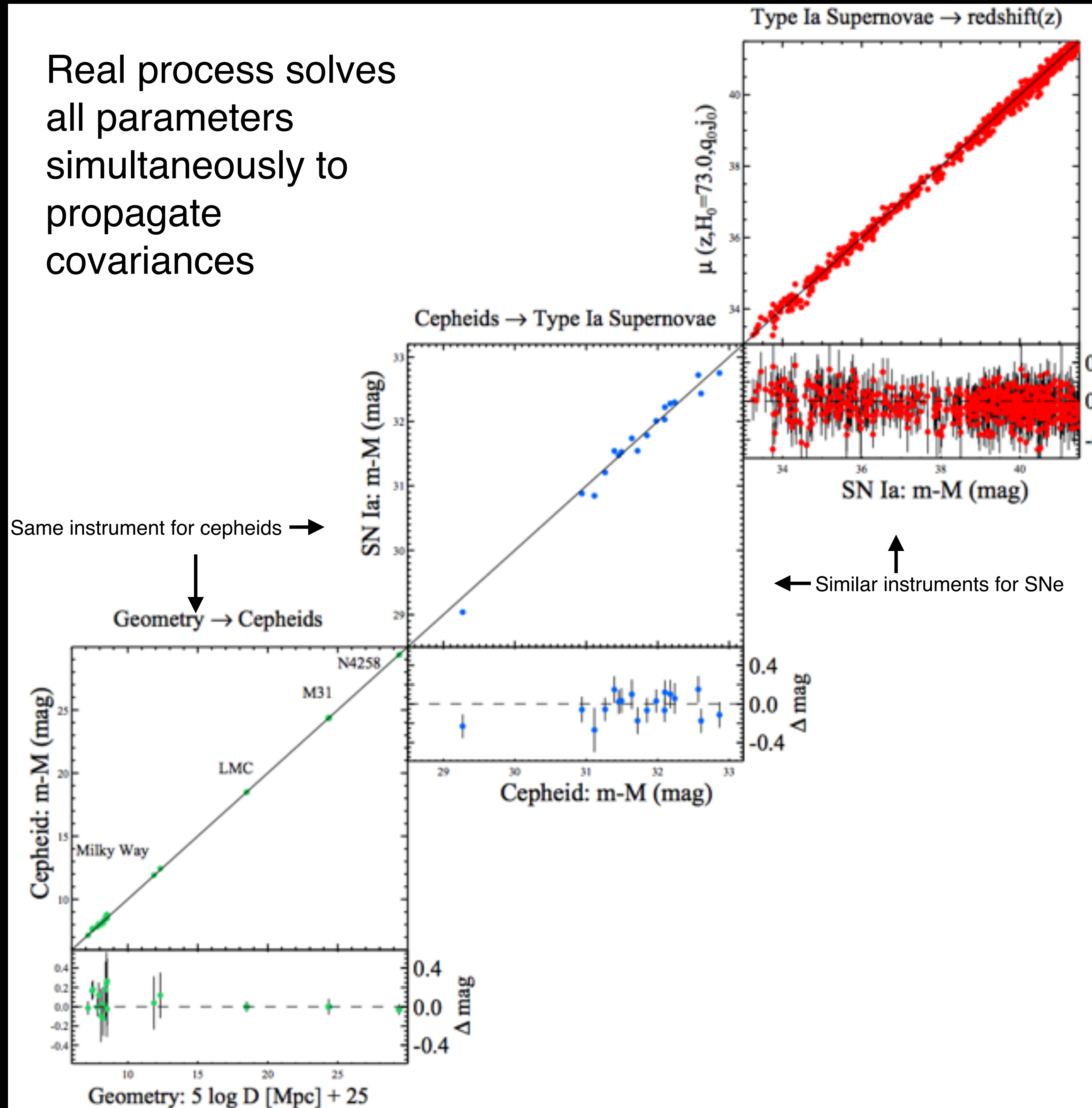
We don’t see evidence from SNe of a local void.

- We already correct for local (peculiar) flows derived from 2M++ density field
- Expect local-to-global ΔH_0 N-body sims in Gpc^3 box, SN, z → ΔH~0.3% Odderskov et al. (2016) and Wu & Huterer (2017)



Kenworthy et al 2018, In prep

The next thing I'm most excited about is SHOES analysis with n=19->n=32 calibrators. Can push even further down on systematic insensitivity.



In next month, new DES w result, new Foundation w result.

In next few months, new Foundation-intercept result.

Year-ish timescale, new SH0ES calibrators result.