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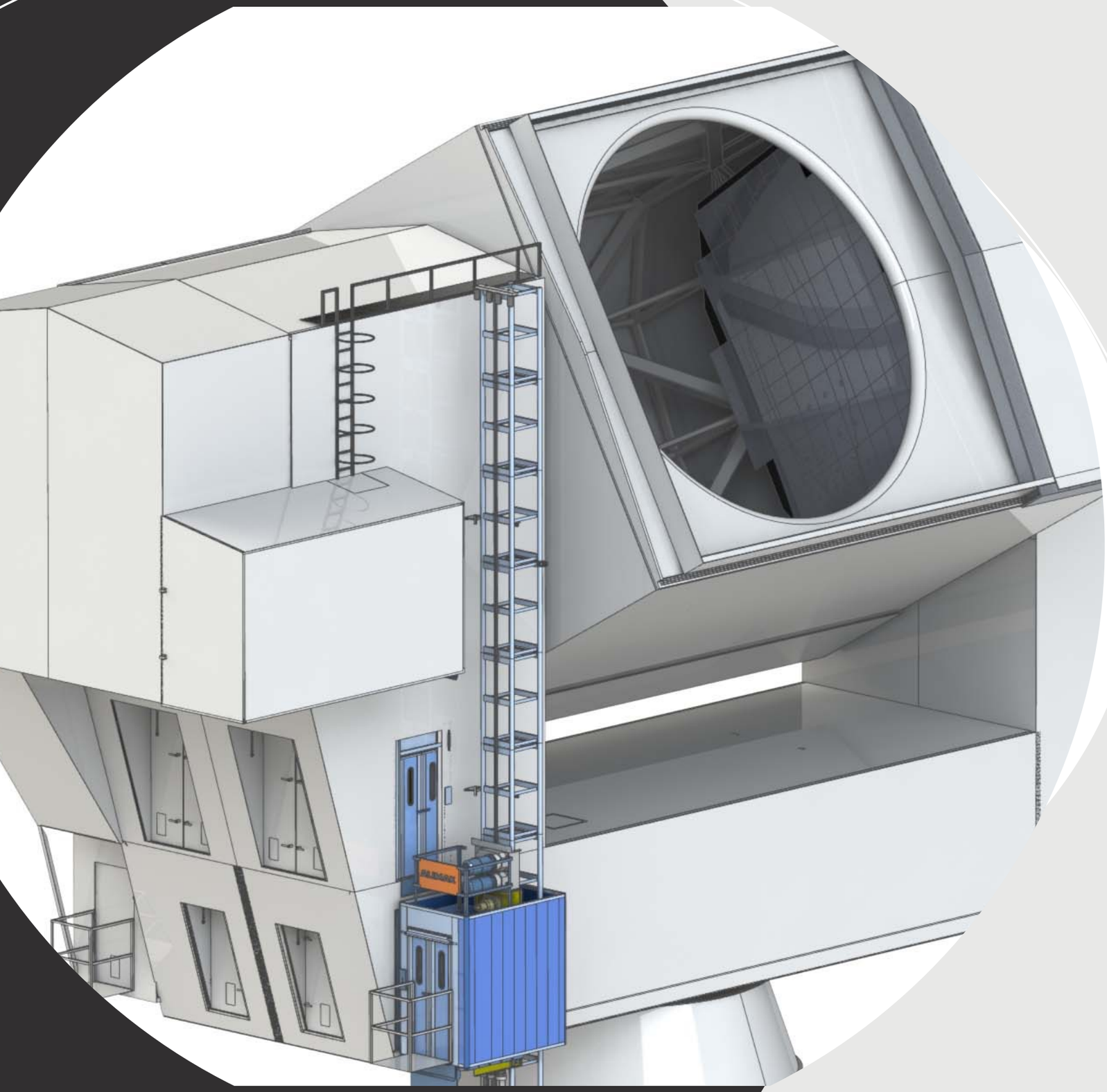

CCATp and LSST

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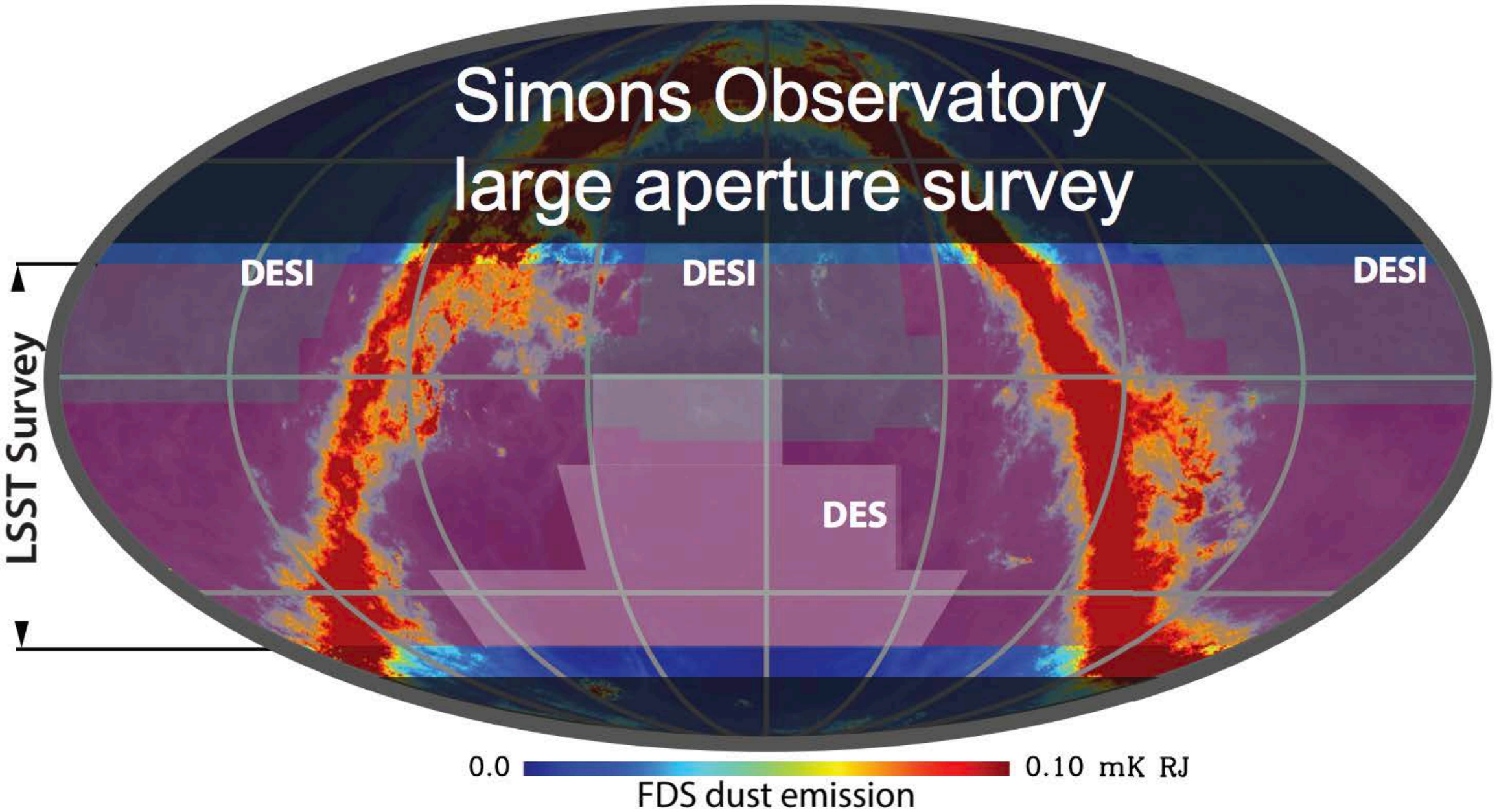
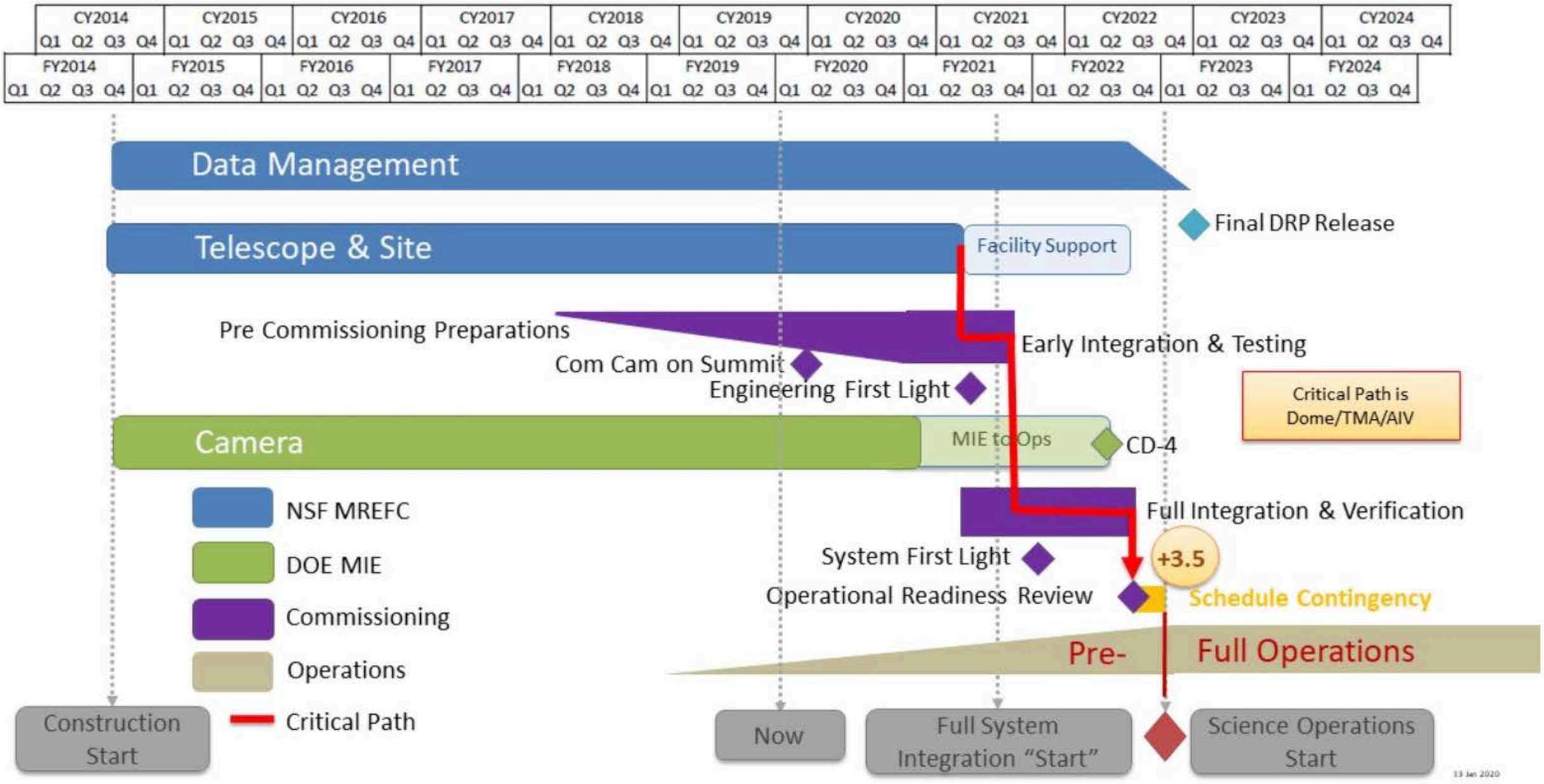


LSST overlap shown with SO LAT survey

LSST Forecast Schedule – 3.5 Months Contingency



https://www.lsst.org/about/timeline

Cross correlation science with CCATp and LSST

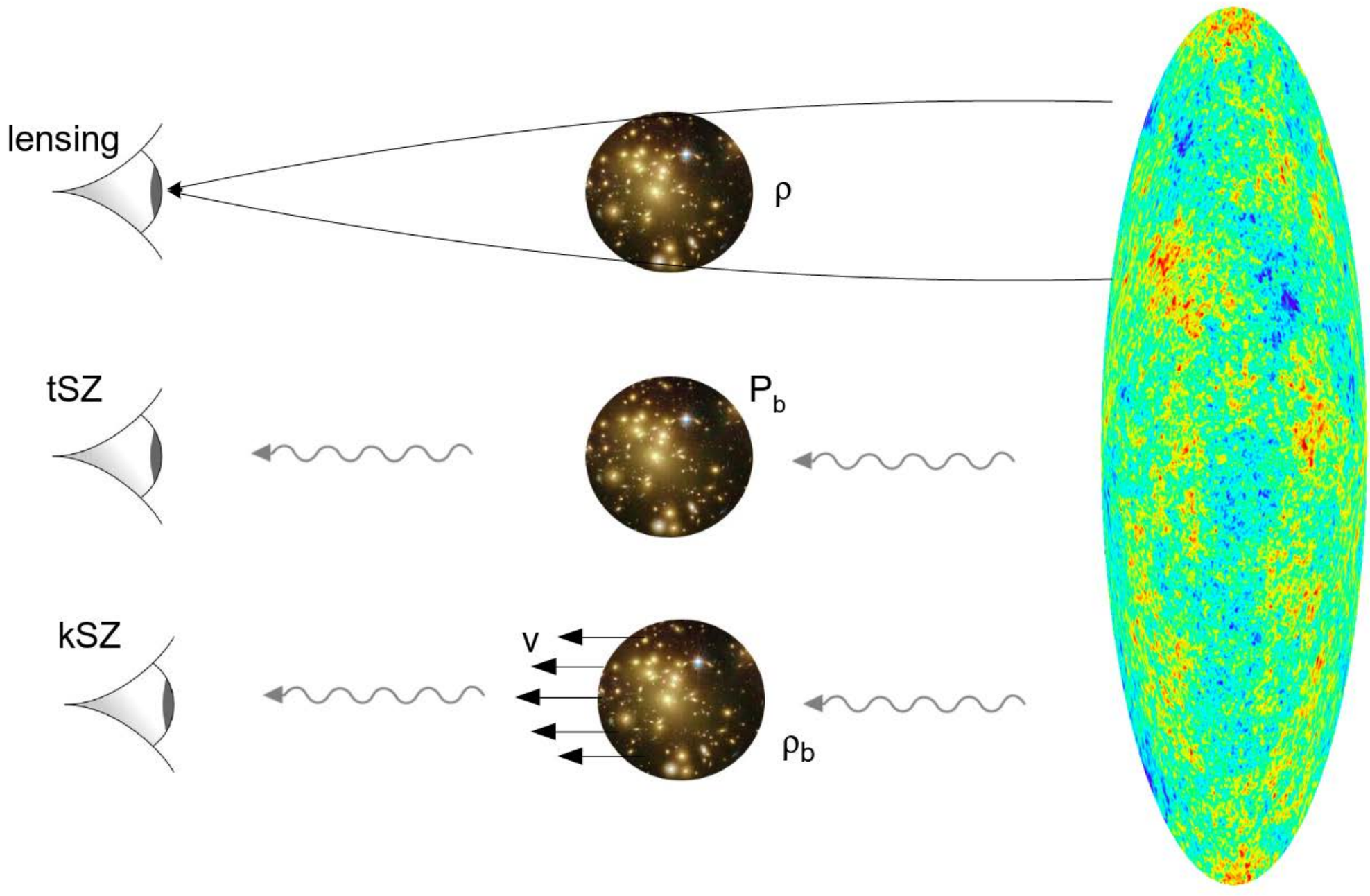


Image: Andrina Nicola

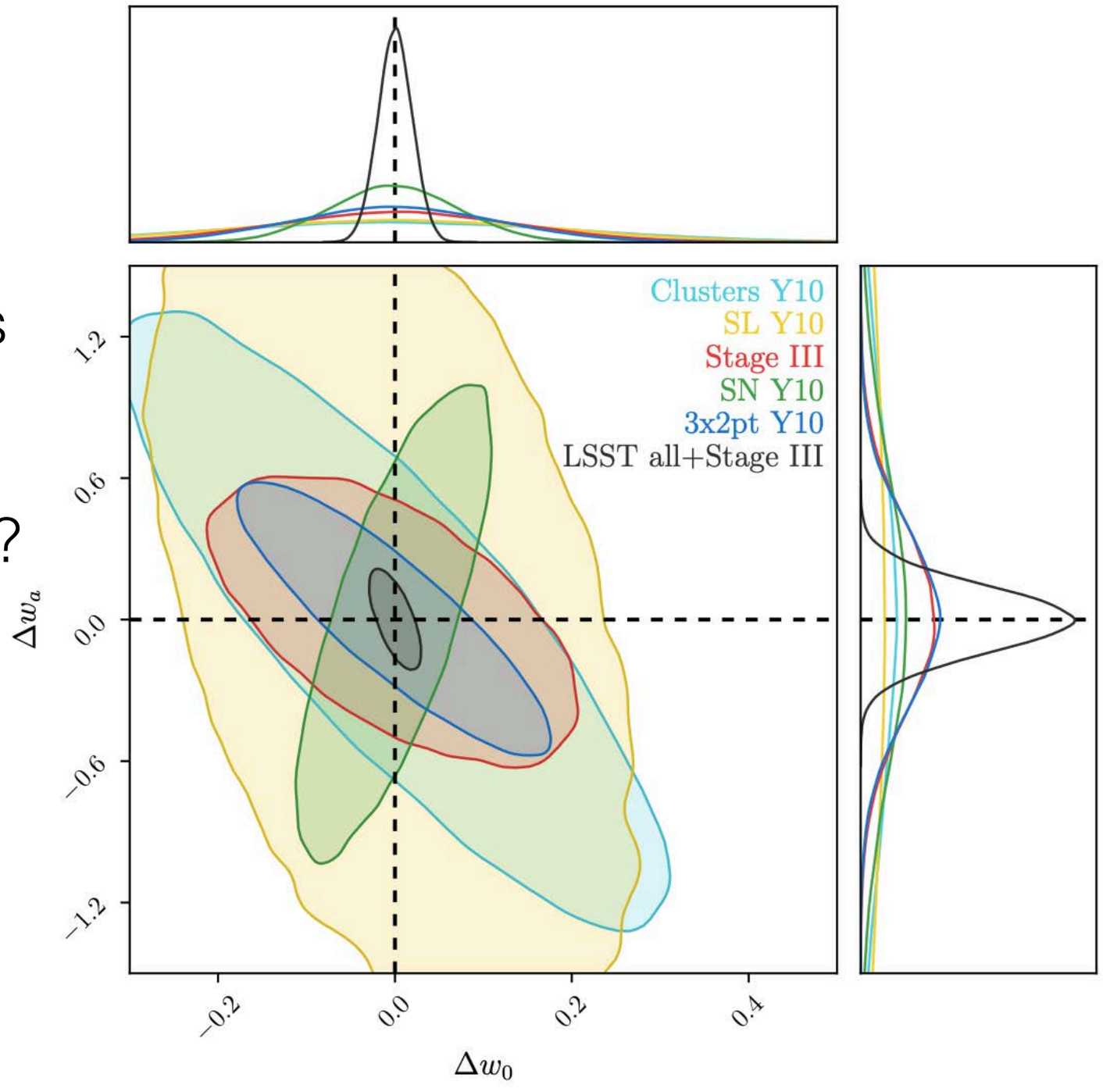
LSST Science Requirements Document

What is the science we could do ‘right away’ with current tools.

What are all the systematics we need to model (even if we aren’t modelling them yet) and what are our plans?

What are the levels of systematics that we can absorb while still achieving DETF FoM we need?

4 main probes: Clusters, Weak Lensing (3x2pt), Supernova, Strong lensing



Mandelbaum++ 2018,
DESC Science Requirements Document

LSST LSS assumptions

LSS, WL, CL

0.2<z<1.2 (Y10 analysis)
(0.1 photo-z bins)

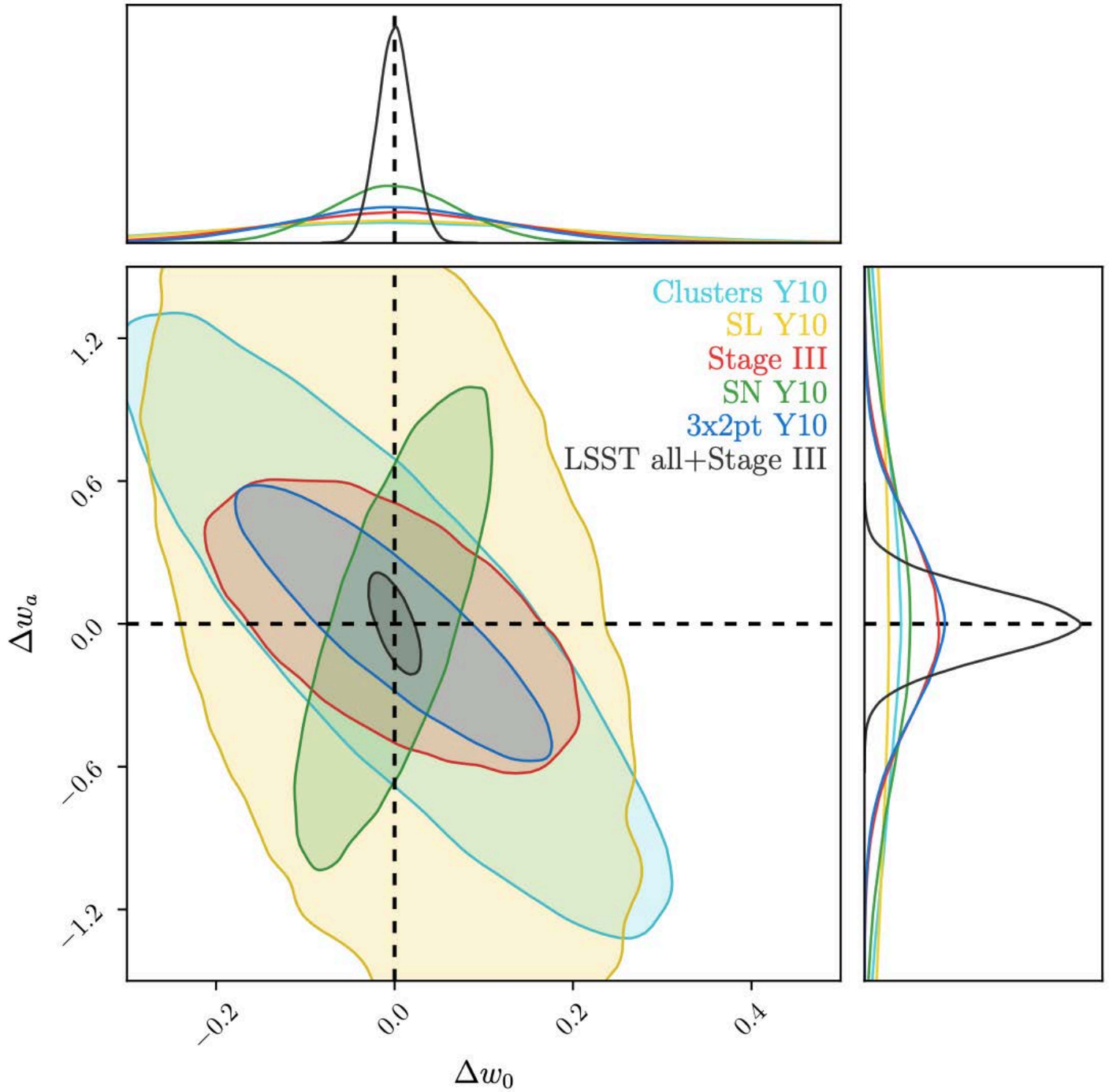
k ~ 0.3h/Mpc

20< l < 1500

density 48 /arcmin^2

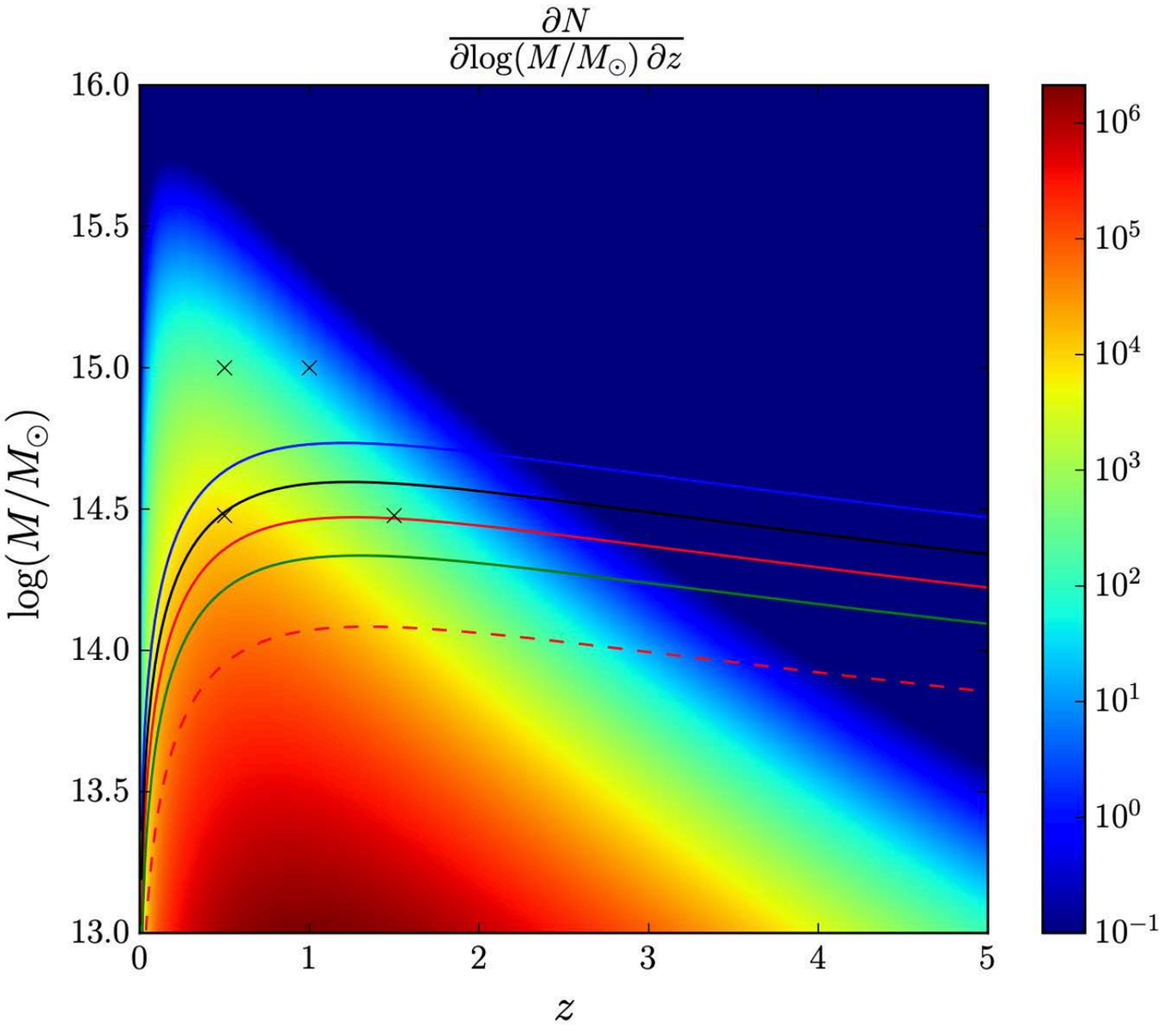
$$\frac{dN}{dz} \propto z^2 \exp\left[-(z/z_0)^\alpha\right]$$

$$\ell_{\rm max} = k_{\rm max}\chi(\langle z\rangle) - 0.5$$



Mandelbaum++ 2018,
DESC Science Requirements Document

LSS+CMB (clusters)



Mittal++ 2017

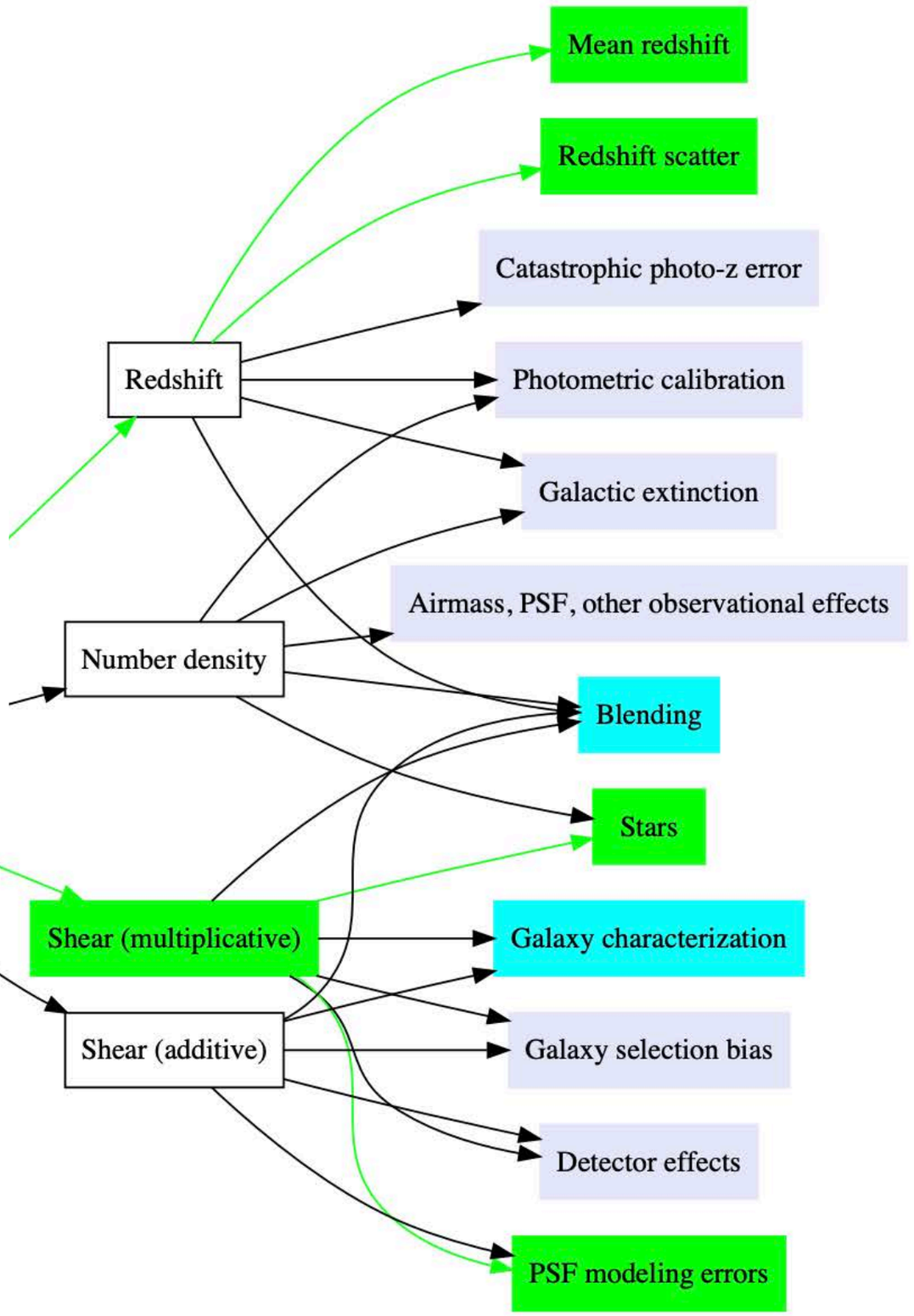
Detailed understanding of cluster properties + optical calibration — “gold sample”

LSS+CMB (lensing)

Self-calibrated systematic uncertainty	Current model	Future plans
Galaxy bias	Linear galaxy bias, one value per tomographic bin (Gaussian prior, mean= 1.9 and $\sigma = 0.9$)	Nonlinear galaxy bias with a redshift-dependent parametrization of the linear bias vs. redshift, and at least one nonlinear bias parameter
Magnification	None	Self-consistent convergence field and luminosity function as what goes into the shear and intrinsic alignments in WL analysis, following e.g. Joachimi & Bridle (2010); marginalize over uncertainty in slope of number counts
Intrinsic alignments	Nonlinear alignment model as in section 4.4 of Krause & Eifler (2017), but with different priors as described in Appendix D2.3	More complex model such as Blazek et al. (2015), with IA and luminosity function parameters marginalized
Baryonic effects	None	Hydrodynamic simulation-motivated emulator for baryonic effects in WL (e.g., Harnois-Déraps et al. 2015)

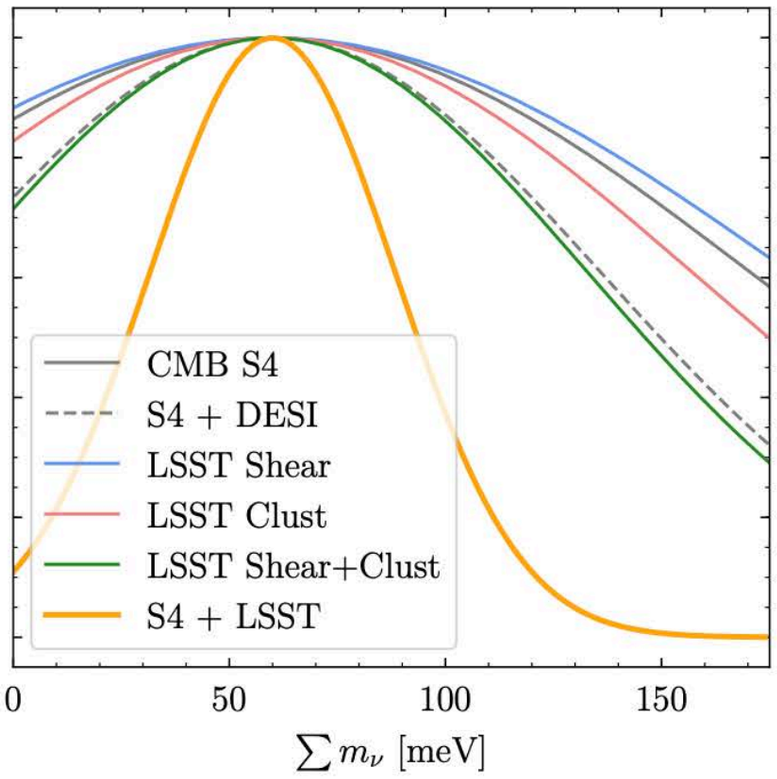
Combination of weak lensing from CMB, 3x2pt optical lensing breaks degeneracies (e.g. bias, baryonic affects)

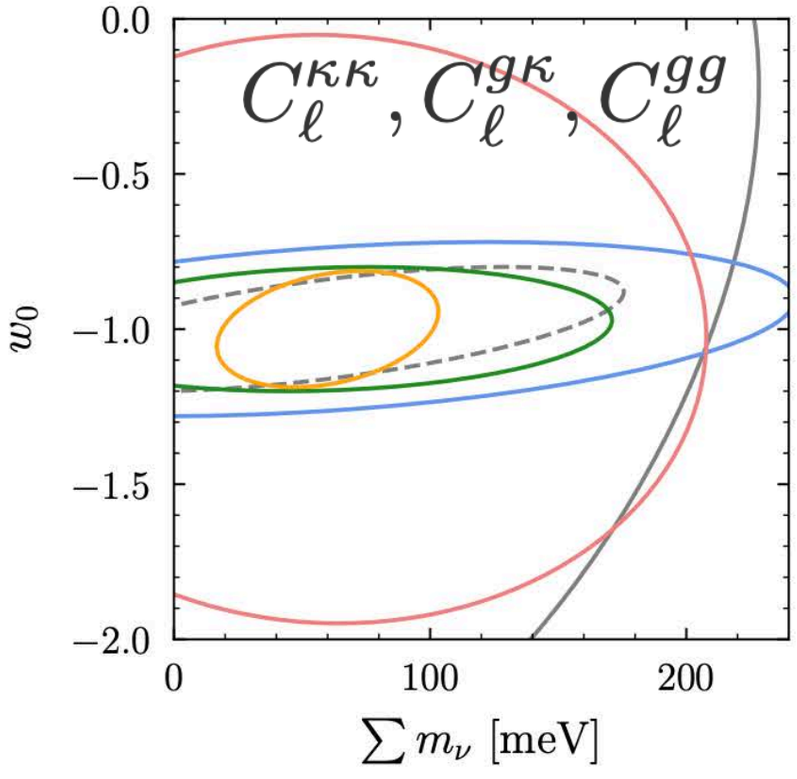
Mandelbaum++ 2018,
DESC Science Requirements Document

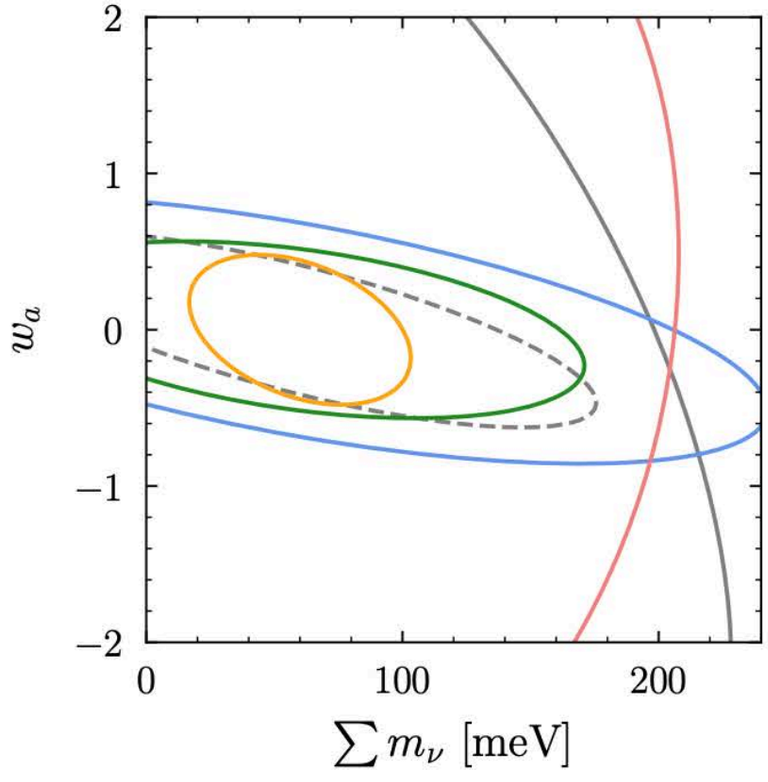


LSS+CMB (lensing)

Mishra-Sharma++ 2018



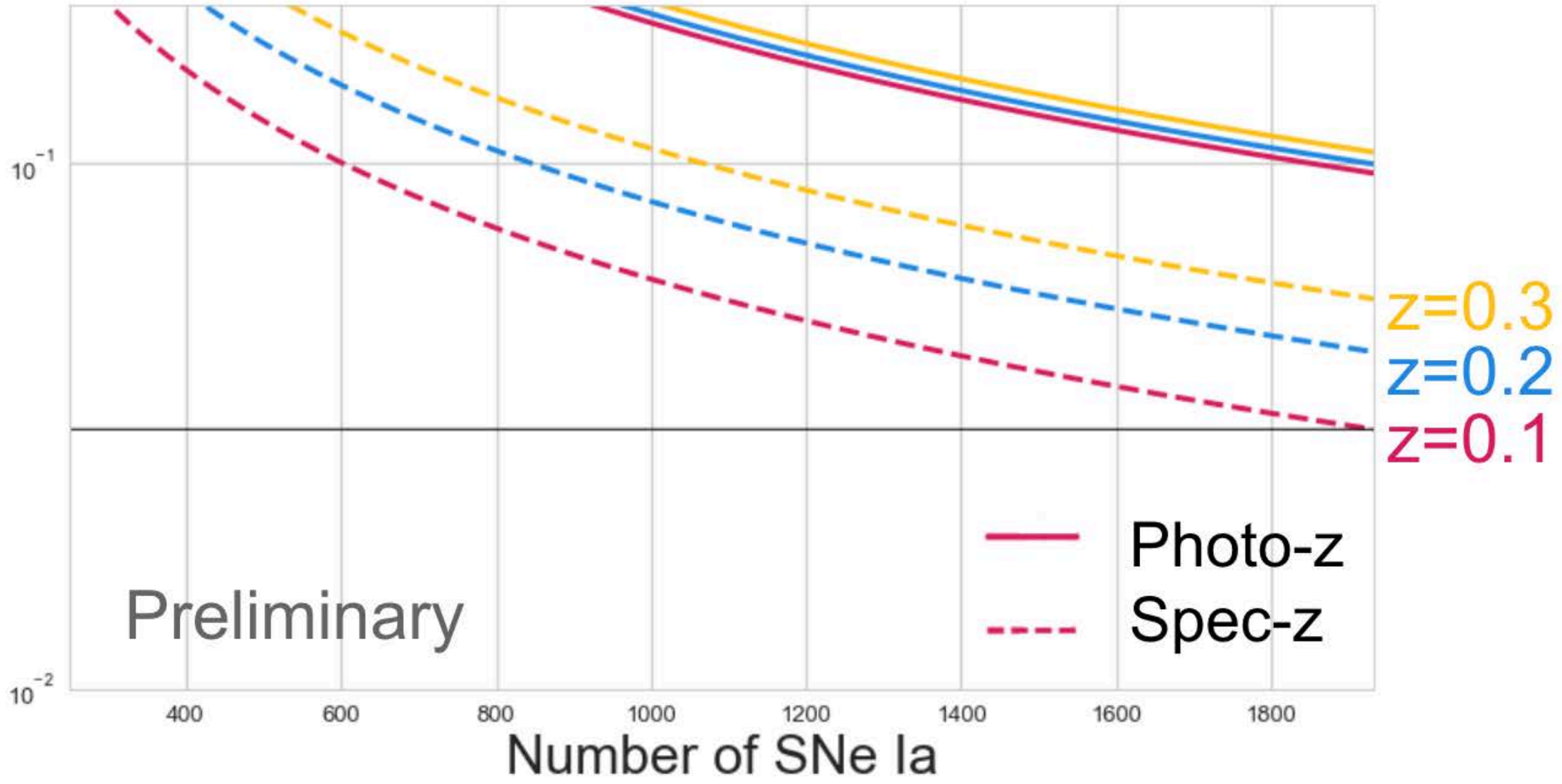




Combination of weak lensing from CMB, 3x2pt optical lensing breaks degeneracies (e.g. bias, baryonic affects)

This study focused on CMBS4, can we investigate improvements with CCATp?

Combining/comparing pairwise velocity constraints



Cosmological Redshift

Redshift from catalog

$$v_{\rm pec} = \frac{c(z(\mu) - z_{\rm meas})}{1 + z_{\rm meas}}$$

Bahmanyar, Hlozek++ (prep)

c.f. Bhattycharya ++ 2010

Galaxy bias systematic, calibrated with WL

- Lots of potential synergy with LSST and also SO (see Niemack's talk)

- Interesting 'main' science cases, e.g. neutrino mass, dark energy but also novel science cases e.g. peculiar velocity

- Worthwhile doing full systematics (from both LSST+CMB) study modelling cross-correlations (SO+LSS investigations underway)