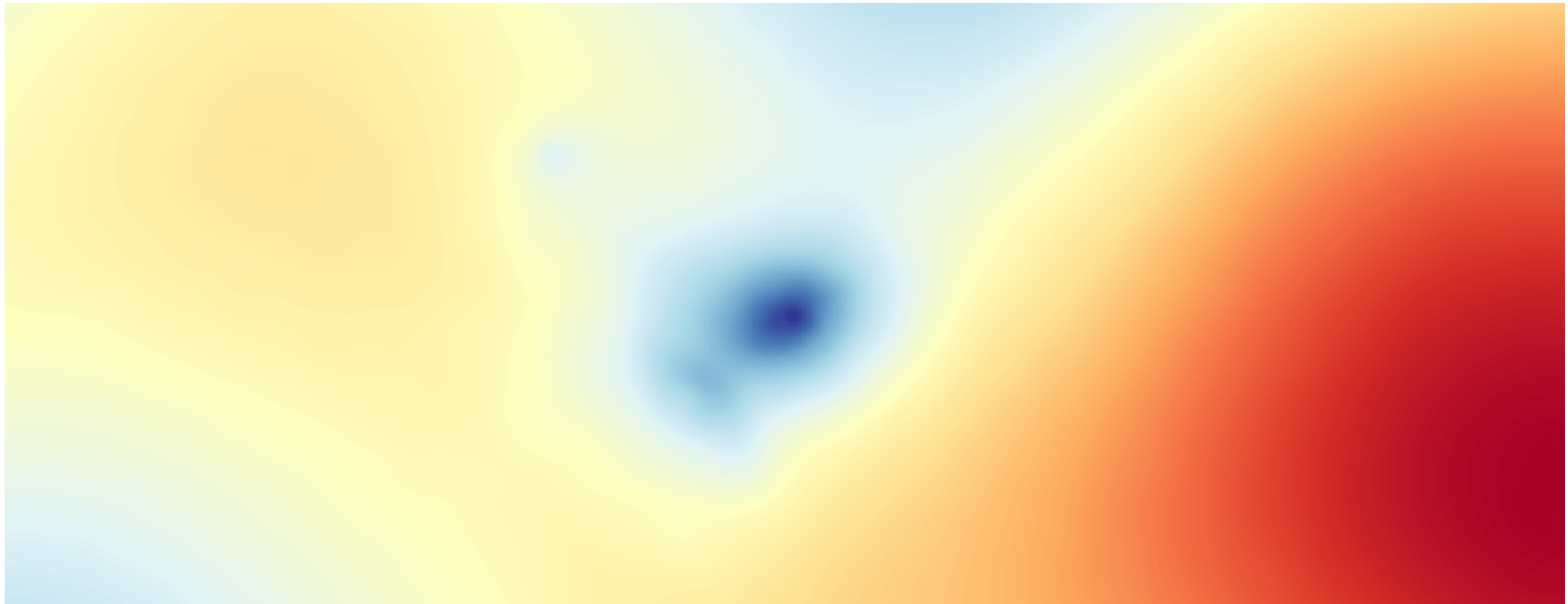
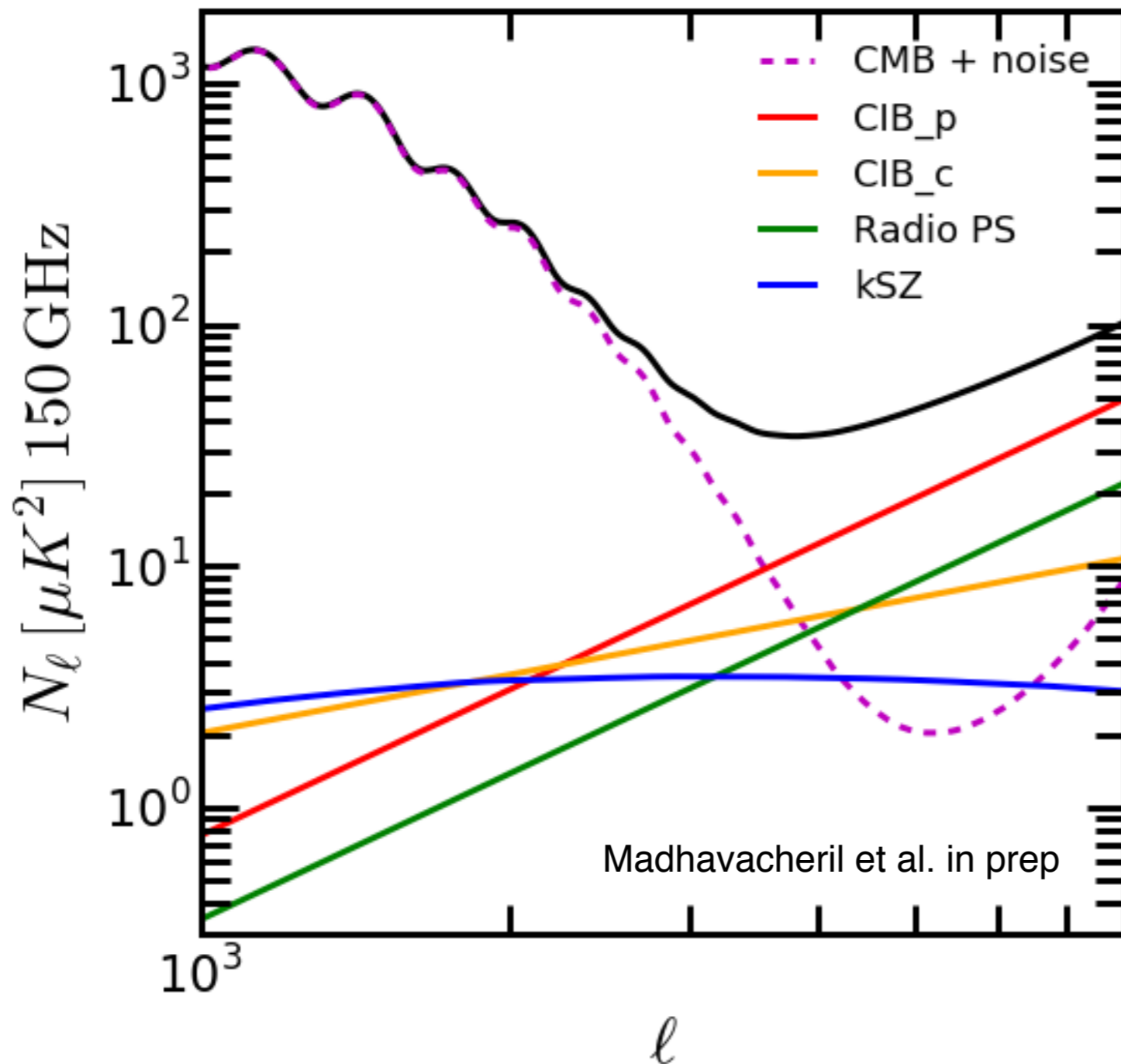


mnu and w from lensing-calibrated clusters



Nick Battaglia
with Mat Madhavacheril, Hironao Miyatake, & David Spergel

What's in the forecast?



95 & 150 GHz at 1.5 $\mu\text{K}'$

S/N > 6 (conservative)
clusters

fsky = 0.4

Including: non-white noise,
CMB, CIB (poisson and
clustered), Radio sources,
and kSZ

Marginalize over scaling
relation uncertainties

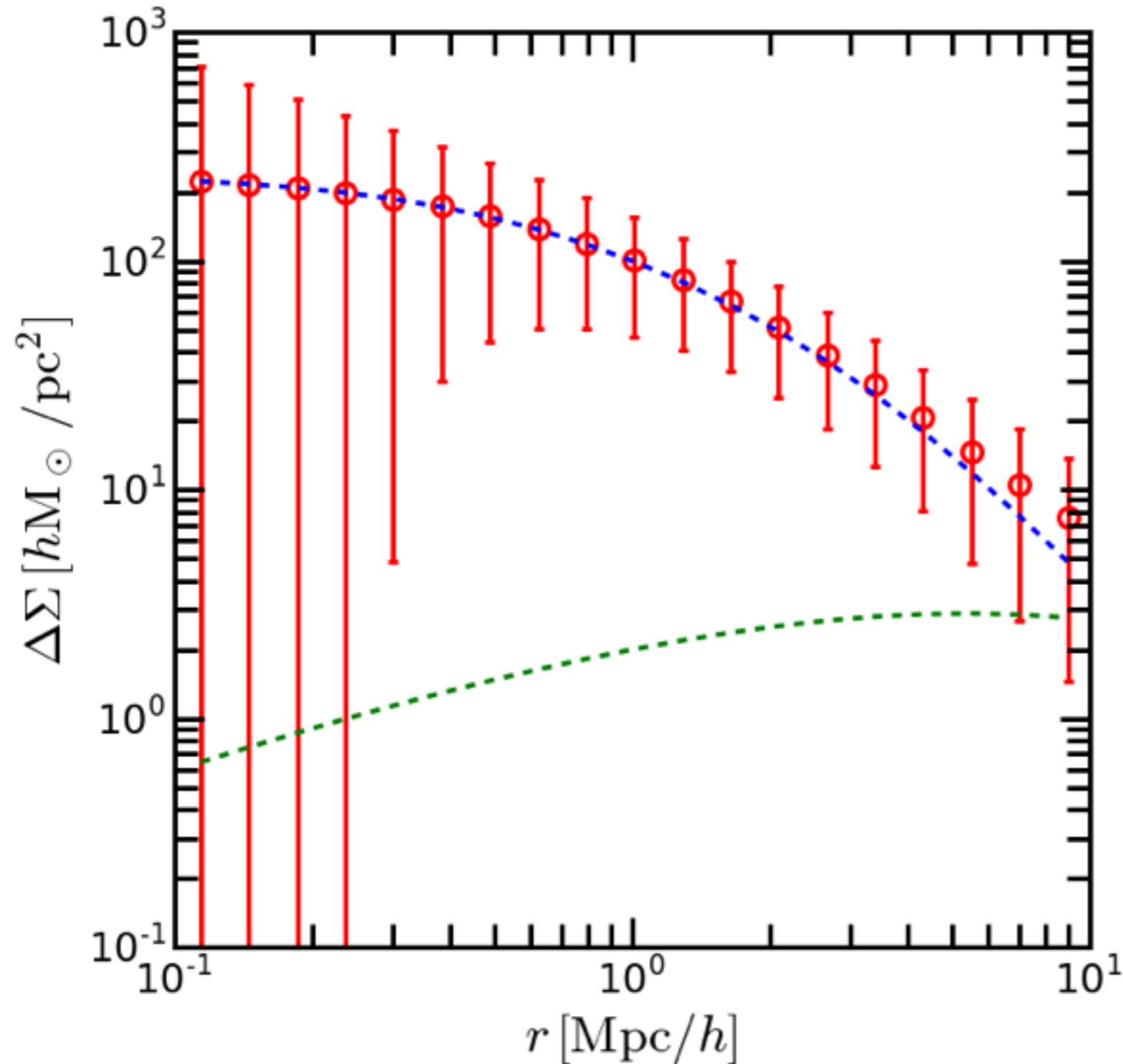
$$A_Y \left(\frac{M}{M_*} \right)^{\alpha_Y} e^{\beta_Y \log^2(M/M_*)} (1+z)^{\gamma_Y}$$

Planck tau prior 0.01 No DESI prior

Marginalize over scatter

Comparisons with Louis & Alonso and Brad Benson via priv. comm

Optical WL mass calibration



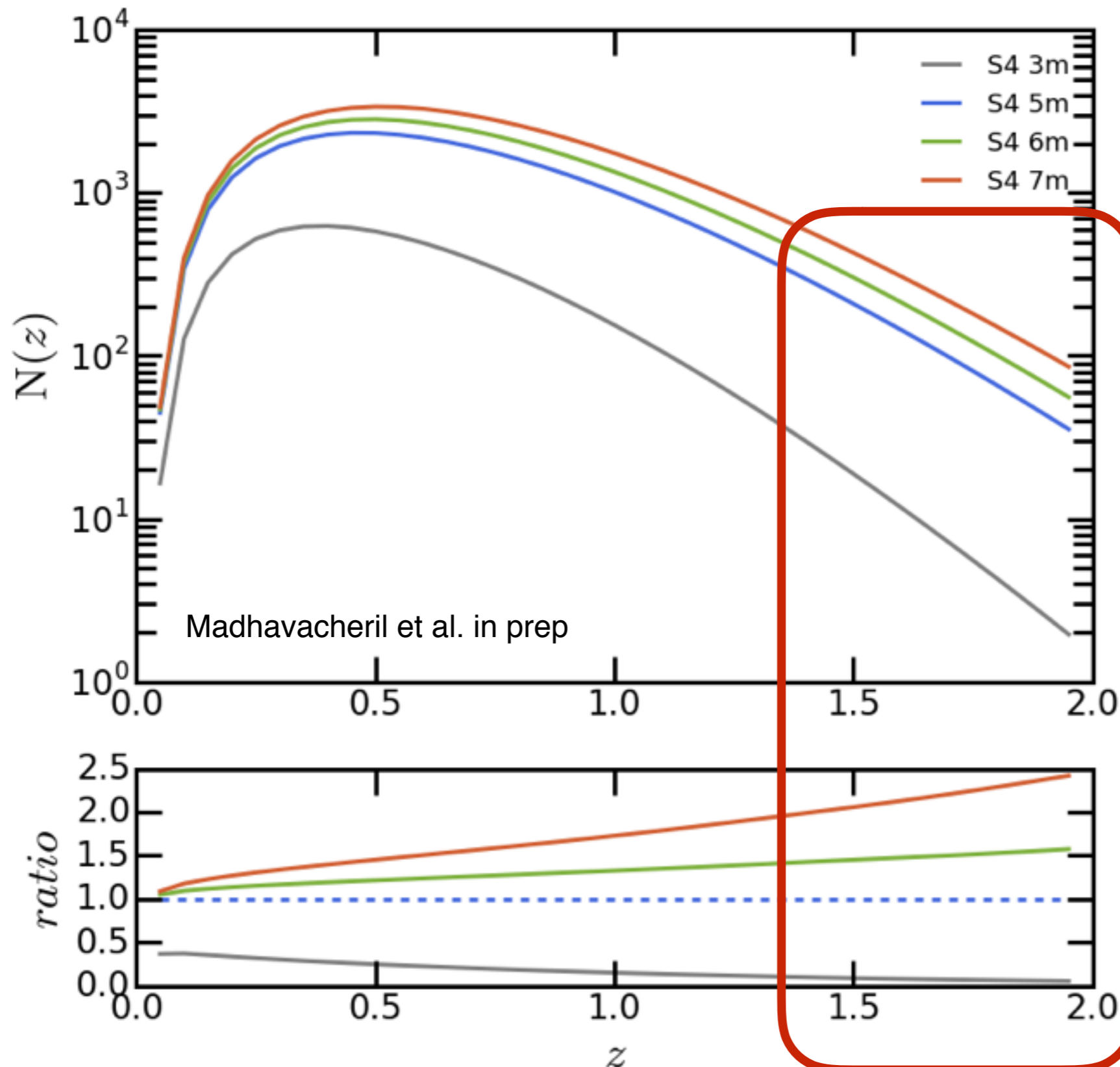
Assume HSC-like coverage
across over entire fields
(ie LSST-lite)

Fit HSC forecast errors
Make $\Delta M/M$ grid

2 modes for Optical WL
use out to $z < 2$
use out to $z < 1$

See Mat's talk for CMB
halo lensing comparison

Cluster number counts



Total clusters $z < 2$
with $S/N > 6$:

3m ~ 8400

5m ~ 37500

6m ~ 47000

7m ~ 58000

Total clusters $z > 1$
with $S/N > 6$:

3m ~ 820

5m ~ 6700

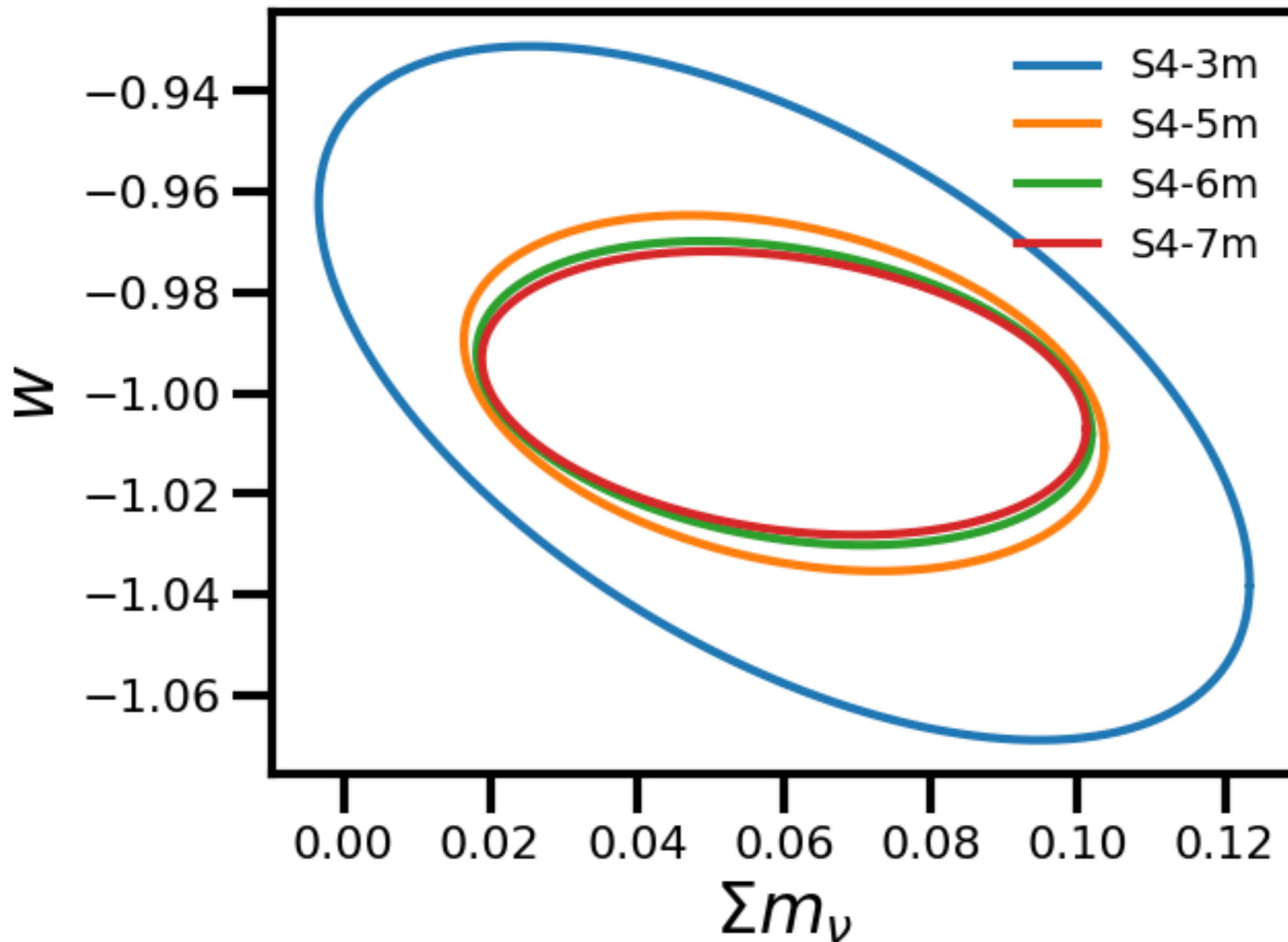
6m ~ 9300

7m ~ 12600

Discovery space

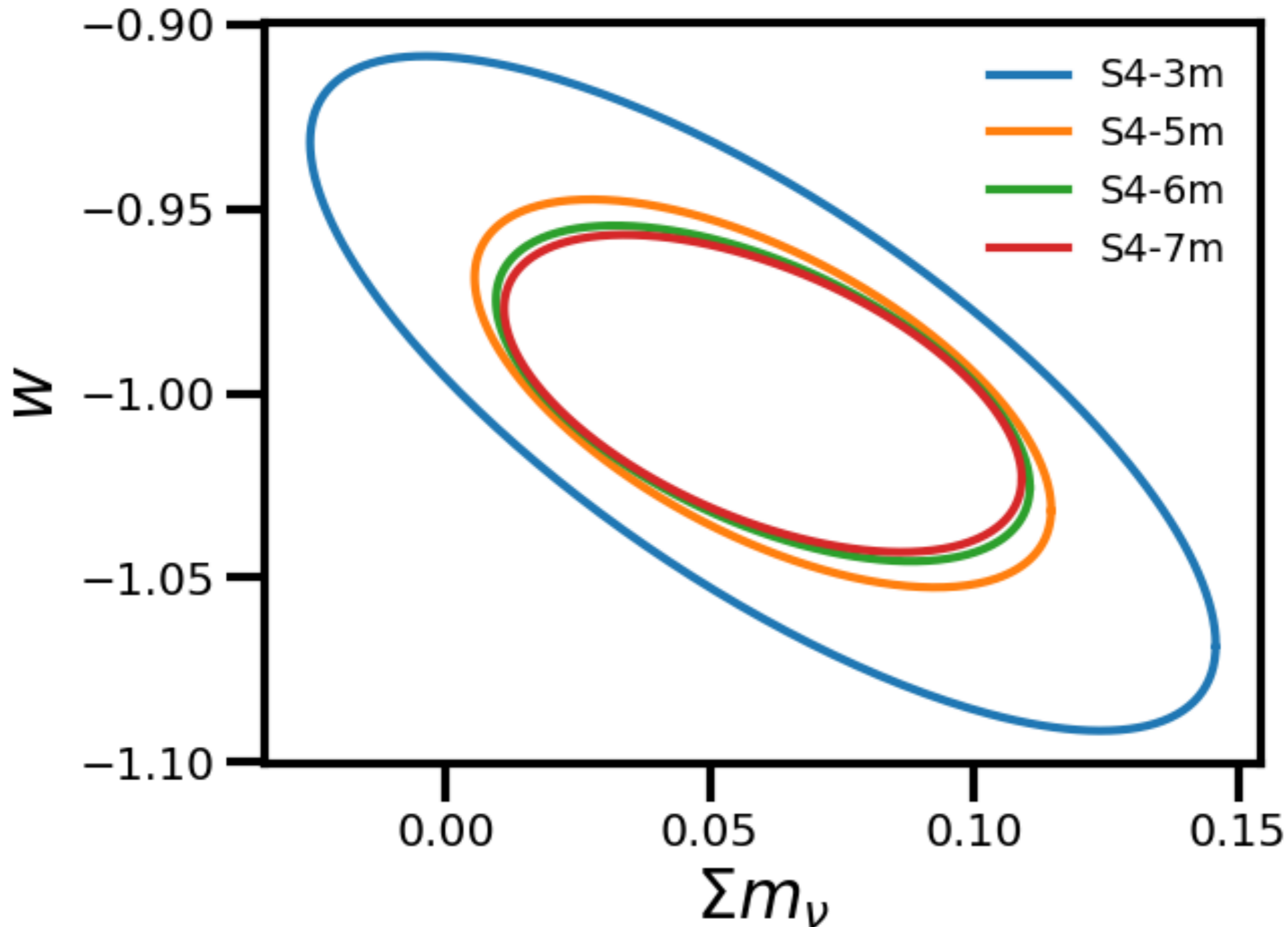
Parameters resolution study

Take away - minimum 5m



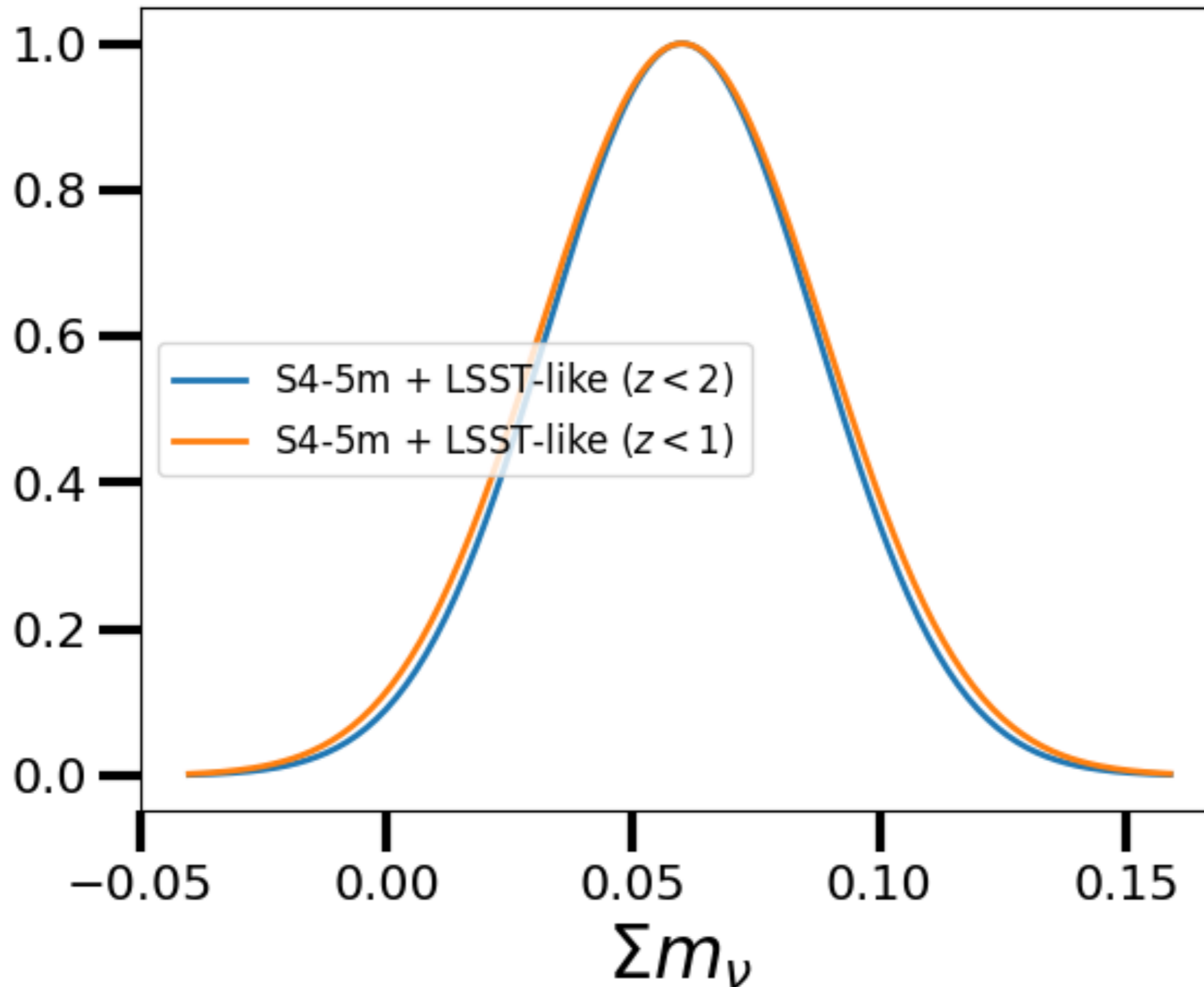
Parameters resolution study

If we only trust optical weak out to $z = 1$



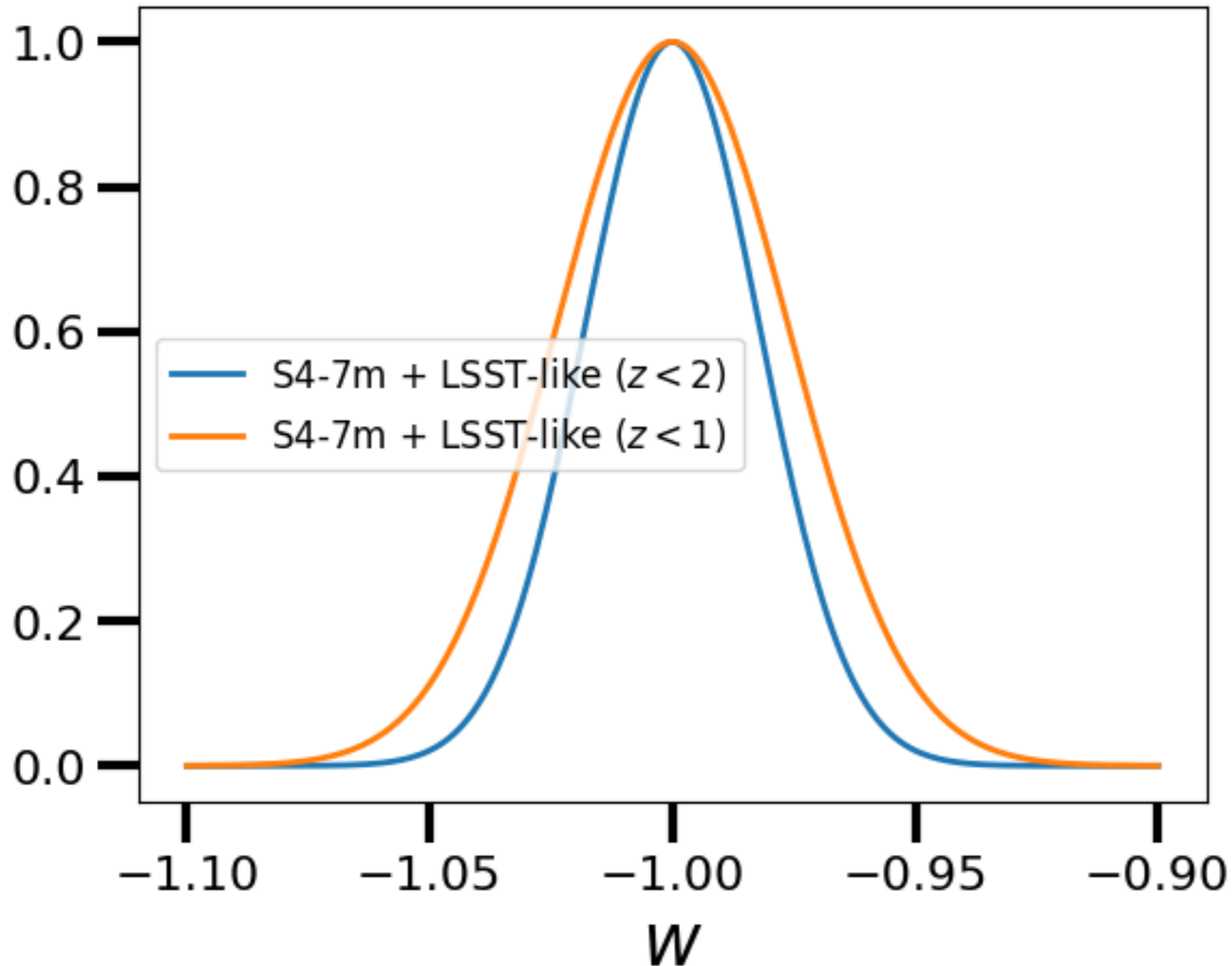
Parameters redshift study

High-z clusters no impact on the sum of neutrino masses

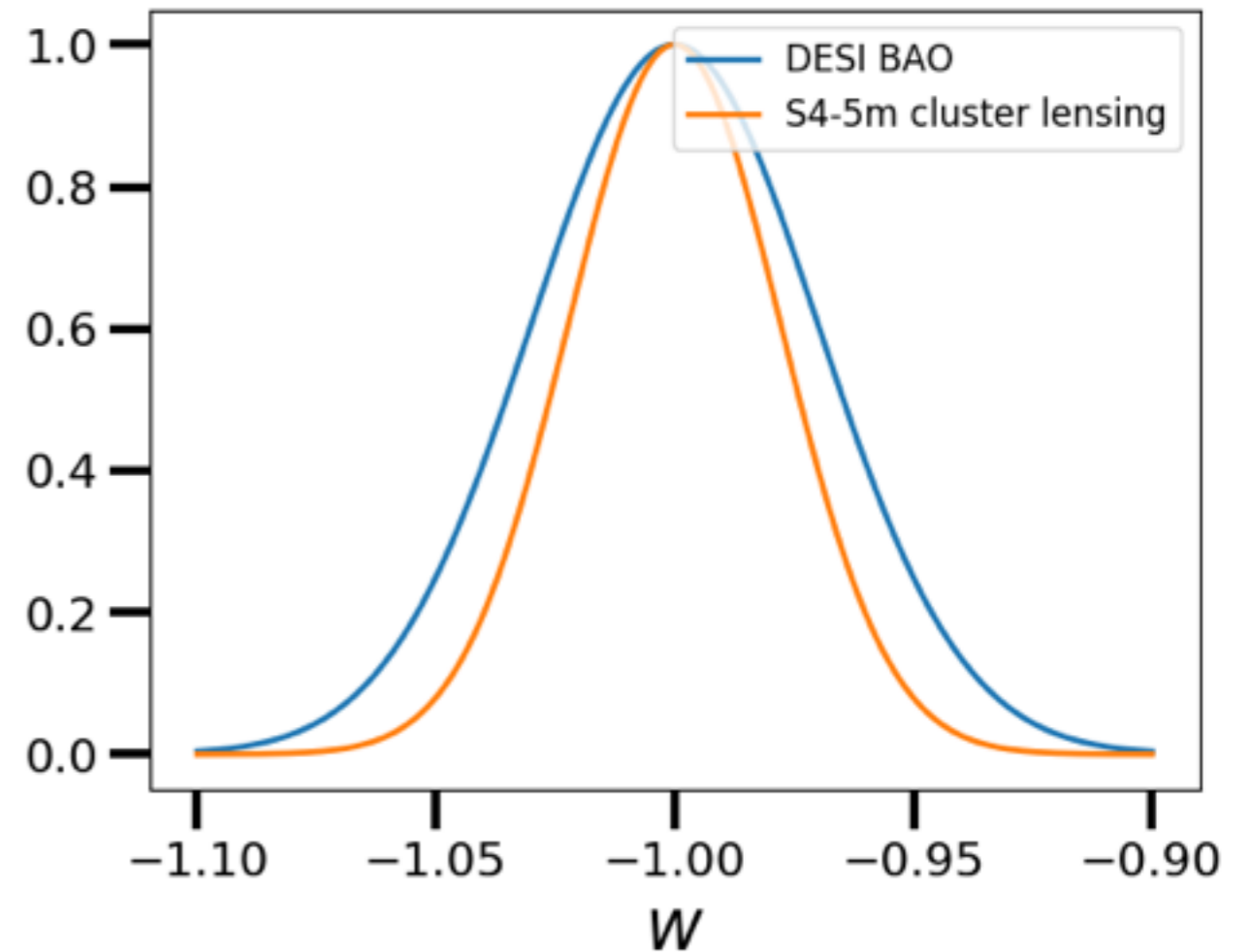
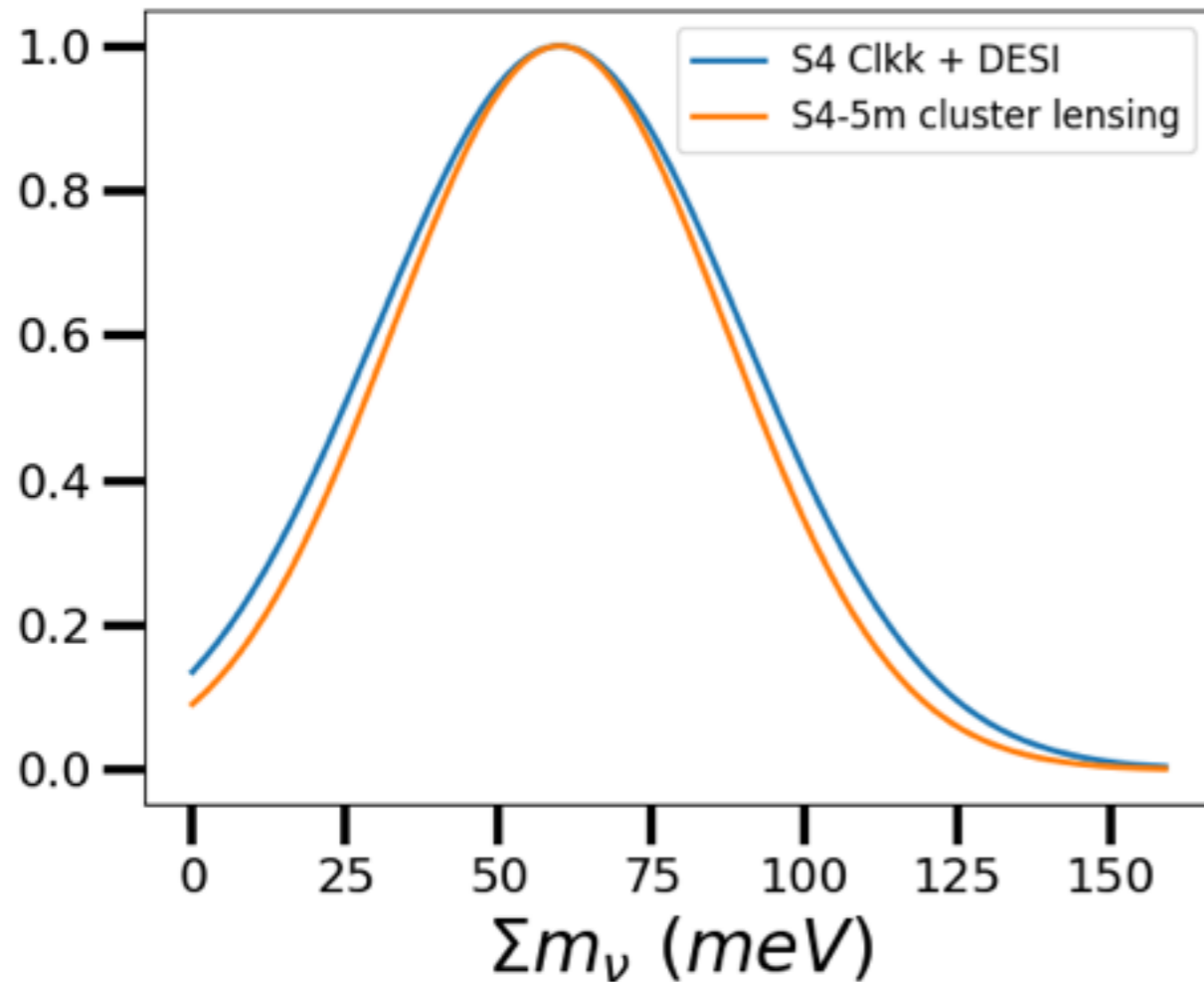


Parameters redshift study

High- z mass calibration does matter for w



Parameters vs. other probes



Competitive, independent, and complementary constraints on the sum of neutrino masses and w

Looking to add more probe comparisons

Summary

SZ clusters are competitive probes of w and m_{ν}

Factor of $\sim 2x$ more high- z clusters going from 5-7m (astrophysics...)

CMB halo lensing (Mat's talk next) for high- z mass calibration

In progress

Test with phase-2 simulations (Colin/Marcelo's talk)

Systematics, Systematics, Systematics (although we're being conservative)

Science requirements

Minimum dish size is 5m for both w and m_{ν}

In the process of vary noise levels and fidelity of mass constraints

Optical surveys are required to confirm clusters and obtain redshifts