Dark energy section of the new SDT report

Basic challenge: The DE section of the Green, Schechter, et al. report is 27 pages, with 18 figures and 6 tables.

We are looking for drastic compression/reduction of detail, relying on the fact that people can look back at the GS et al. report if they wish.

Here is a potential strategy --- suggestions welcome ! --- and some open questions.

Figure and table numbers are referenced to the equivalent tables in GS et al.

Some overall issues

To what extent is the survey strategy of the High Latitude Survey described in this section vs. described elsewhere in the report? In GS et al., the dark energy section is where most of the description of the HLS appears.

Do we keep the requirements lists like we had in GS et al.?

How much comparison to DRM1 performance do we put in this section?

Outline of section

Overview:

Why cosmic acceleration is interesting.

The methods WFIRST will use to study it.

Performance forecasts, framed in terms of precision on observables, with basis to follow in next subsections.

The supernova survey

The HLS imaging survey: weak lensing

The HLS galaxy redshift survey: BAO, RSD, and P(k)

Summary

Overview:

Why cosmic acceleration is interesting.

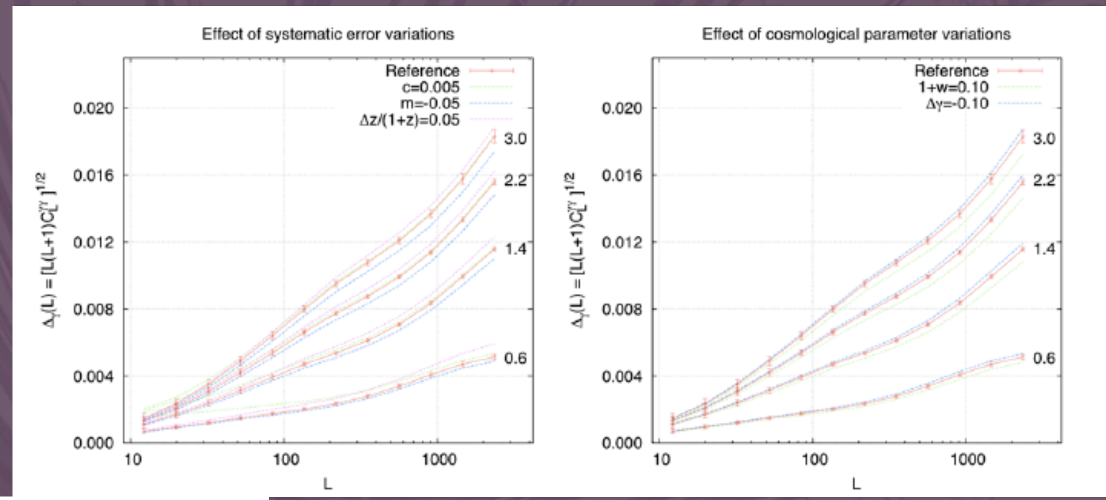
The methods WFIRST will use to study it.

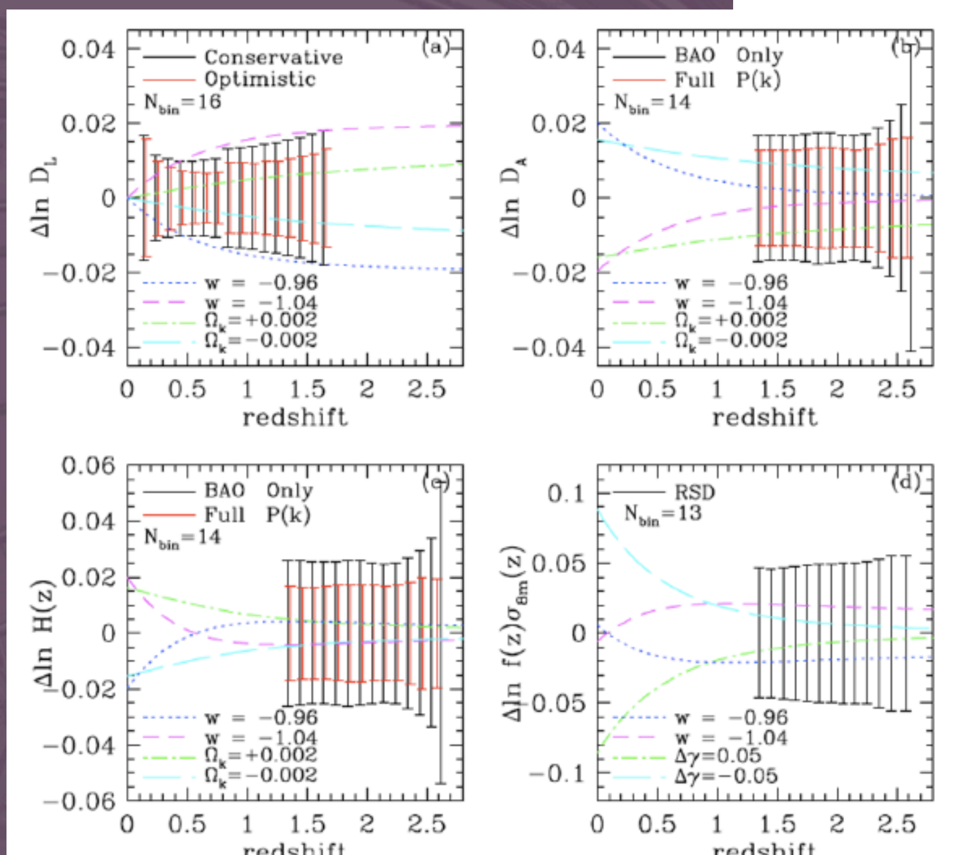
Performance forecasts, framed in terms of precision on observables, with basis to follow in next subsections.

Figures: Equivalent of Figs 26 and 27, forecast errors on $D_L(z)$, $D_A(z)$, $H(z)$, and $f\sigma_8(z)$, and on WL power spectrum.

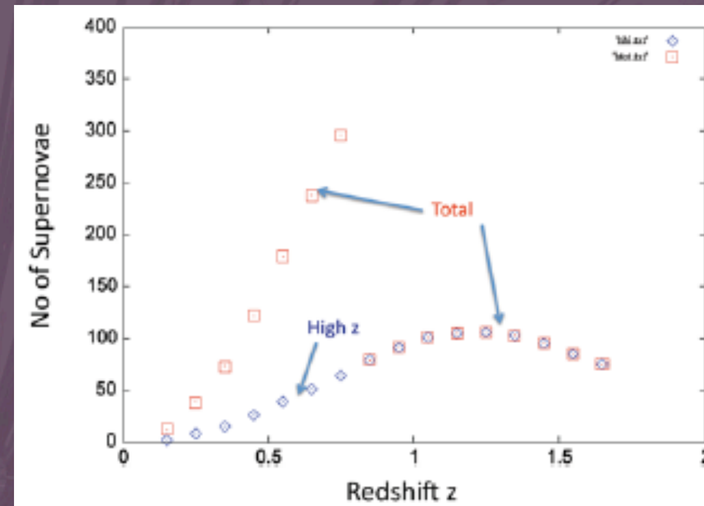
We'll need to calculate these errors once we have finalized survey parameters and depth calculations.

Add a forecast for $\Omega_m^{0.4}\,\sigma_8(z)$ from clusters?


Effect of systematic error variations
Reference
c=0.005
m=-0.05
Δz/(1+z)=0.05
3.0
2.2
1.4
0.6
L
Effect of cosmological parameter variations
Reference
1+w=0.10
Δγ=-0.10
3.0
2.2
1.4
0.6
L


(a)
Conservative
Optimistic
N_bin=16
Δln D_L
redshift
w = −0.96
w = −1.04
Ω_k=+0.002
Ω_k=−0.002
(b)
BAO Only
Full P(k)
N_bin=14
Δln D_A
redshift
w = −0.96
w = −1.04
Ω_k=+0.002
Ω_k=−0.002
(c)
BAO Only
Full P(k)
N_bin=14
Δln H(z)
redshift
w = −0.96
w = −1.04
Ω_k=+0.002
Ω_k=−0.002
(d)
RSD
N_bin=13
Δln f(z)σ_8m(z)
redshift
w = −0.96
w = −1.04
Δγ=0.05
Δγ=−0.05

Supernovae:



Survey strategy.
Quality of data.
Error model.

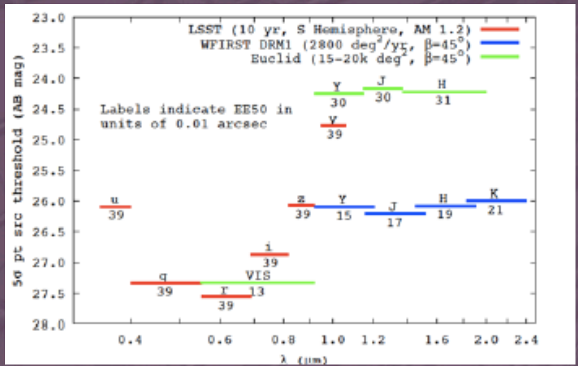
Figure: Expected # SNe in redshift bins, like Fig 16

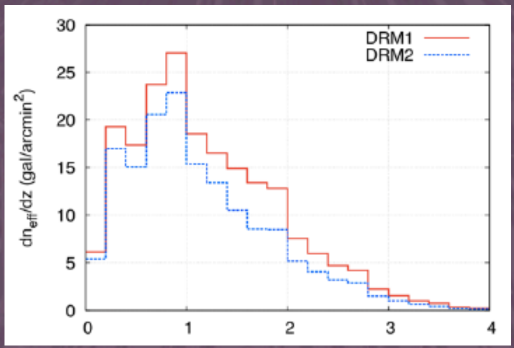
TBD:
What *is* the strategy?
To what extent do we deal with prism vs. IFU options here, vs. an Appendix.
Can we formulate a better systematic error budget than we did in GS et al., especially with regard to calibration?

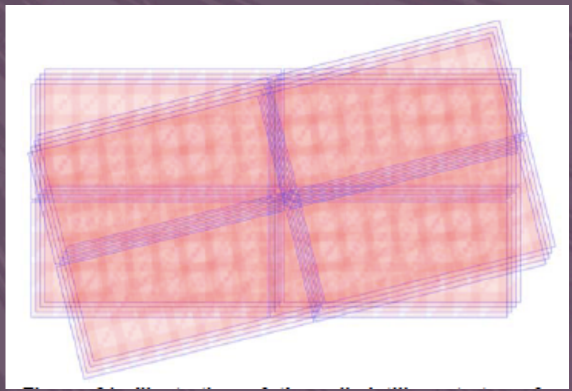
The HLS imaging survey: weak lensing

Survey strategy, performance, systematics and control thereof.
Mostly drop the comparison to Euclid and LSST.

Figures:
Depth of HLS imaging (Fig 19)
Redshift distribution of WL sources (Fig 22)
  Compare to DRM1 ?
Move the tiling figure (Fig 21) elsewhere, or keep it here?







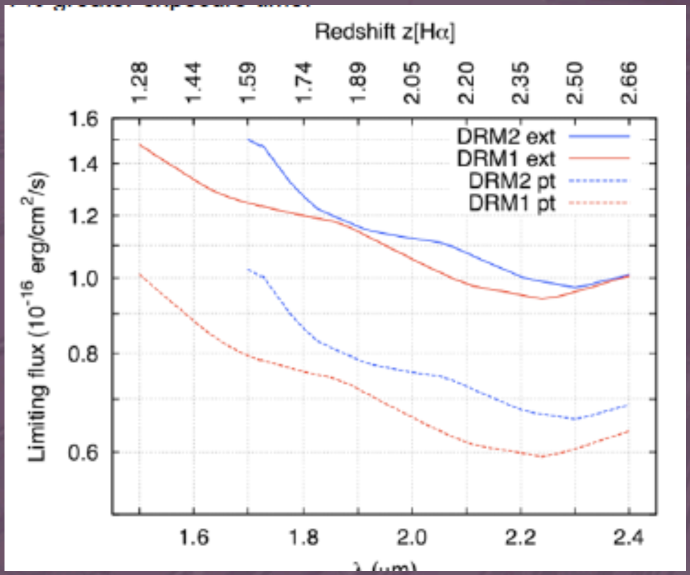
The HLS galaxy redshift survey:

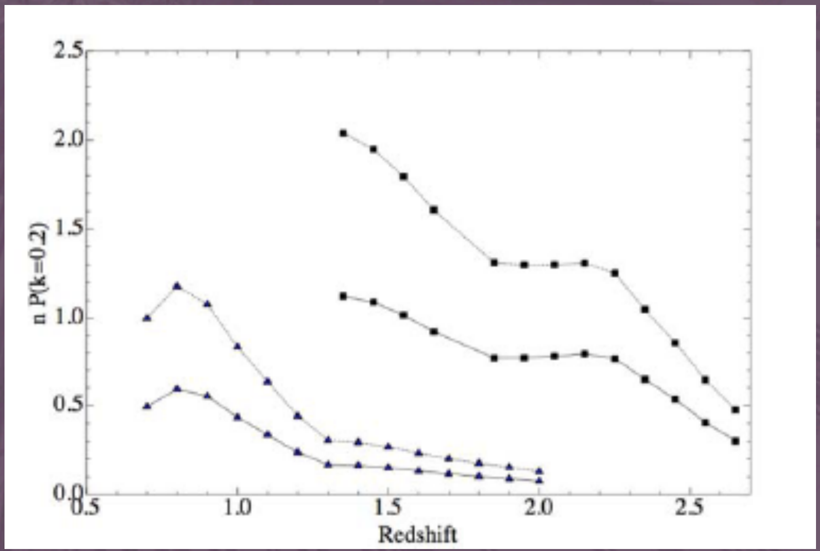
Survey strategy, depth, implications for BAO and P(k).

Figures:

Depth of HLS spectroscopy (Fig 23) – compare to DRM1 ?

nP vs. z (Fig 24) – compare to Euclid and DRM1





Tables to keep:

- HLS survey rate parameters (Table 7): add depth (Table 9) and WL n_eff (Table 10) columns to this table.
- GRS dN/dV table. Add an nP column?
- Drop the FoM table (Table 12). No DETF FoM in the section at all.

Mode	Exposure Time	Survey Time [days per 1000 deg^2]
Imaging – Y	5 x 150 s	31.3
Imaging – J	6 x 150 s	36.8
Imaging – H	5 x 150 s	31.3
Imaging – K	5 x 150 s	31.3
Spectroscopy	6 x 530 s	126.6
Total		257.3

Table 7: Survey Rate Parameters for DRM1 (Exposure

Red-shift z	DRM1		DRM2	
	dN/dV Mpc^{-3}	dN/dz/dA deg^{-2}	dN/dV Mpc^{-3}	dN/dz/dA deg^{-2}
1.35	3.77×10^{-4}	3990	N/A	N/A
1.45	3.73×10^{-4}	4123	N/A	N/A
1.55	3.55×10^{-4}	4075	N/A	N/A
1.65	3.28×10^{-4}	3874	2.18×10^{-4}	2578
1.75	3.03×10^{-4}	3673	2.55×10^{-4}	3087
1.85	2.84×10^{-4}	3502	2.60×10^{-4}	3207
1.95	2.89×10^{-4}	3629	2.55×10^{-4}	3194
2.05	2.97×10^{-4}	3774	2.42×10^{-4}	3075
2.15	3.07×10^{-4}	3930	2.33×10^{-4}	2990
2.25	3.01×10^{-4}	3881	2.35×10^{-4}	3036
2.35	2.58×10^{-4}	3346	2.12×10^{-4}	2742
2.45	2.16×10^{-4}	2806	1.81×10^{-4}	2356
2.55	1.66×10^{-4}	2156	1.48×10^{-4}	1922
2.65	1.25×10^{-4}	1631	1.12×10^{-4}	1457

Summary subsection:

Discuss aggregate precision of measurements, compare to DRM1.

Discuss imaging depth and # of WL shape measurements relative to DRM1 and Euclid (and LSST?). Mention WL systematics control once again.

Discuss # of redshift measurements and nP vs. DRM1 and Euclid.

Say that we will test current paradigm more broadly, more robustly, and at much higher precision than present; plenty of chances to uncover surprises.