

The Dark Energy Survey

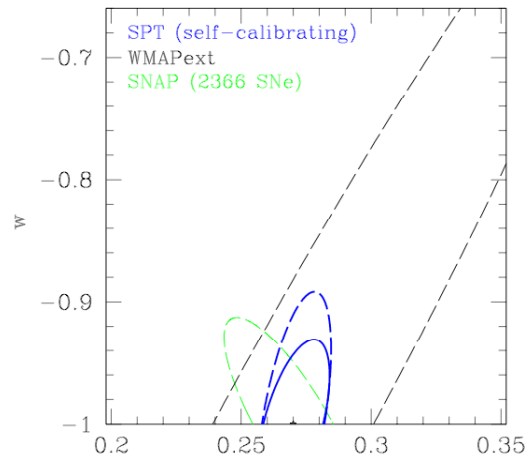
- Aimed at precision measurements of Dark Energy
- 5000 sq-degree 4-bandpass sky survey
 - g,r,i,z $i=24, z=23.6$
 - Photometric redshifts for South Pole Telescope SZ cluster survey to $z > 1$.
 - Cluster counting via SZ, optical, WL
 - Weak lensing: shear-shear and shear-galaxy power spectra
 - Galaxy angular power spectra
 - SN light curves: 1 hour per night for 60 nights over 5 years
- The Dark Energy Camera
 - CTIO 4m prime focus
 - 2 degree FOV corrector
 - 66 CCD, 500 megapixel focal plane array
 - Full depletion LBNL CCDs
 - ~500 nights over 5 years

The Dark Energy Survey

- Physics of the Universe
 - “immediate priority is heavily weighted towards investigation of Dark Energy”
- DOE Office of Science
 - HEP performs experiments that explore the fundamental nature of matter, energy, space, and time, often leading to the development of cutting edge technology
 - DOE teams most often centered at one of the National Labs, almost always including university-based researchers
- Fermilab
 - Dark Matter: SDSS and CDMS
 - Dark Energy: DES and JDEM
- DES collaboration
 - Fermilab, University of Illinois, NOAO, NCSA, University of Chicago, LBNL, Carnegie
- NOAO Long Range Plan
 - CTIO 4m aimed at wide field imaging
- CTIO
 - Announcement of opportunity
 - Major instrumentation in return for up to 30% telescope time over 5 years
- The System and Surveys
 - 4m telescope: imaging surveys
 - 8m telescopes: spectroscopic surveys
 - [Experiment driven collaborations provide instrumentation/software](#)
 - Surveys provide the best science for the most researchers at the least cost

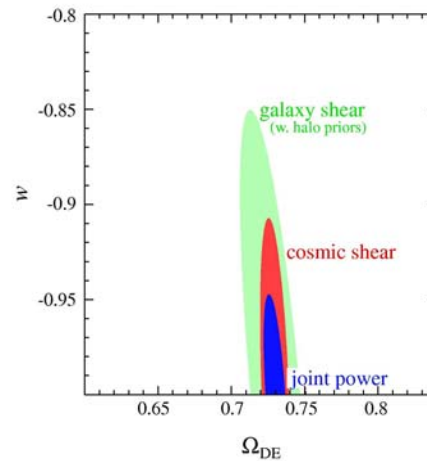
We aim at $\sim 5\%$ precision on Dark Energy

Cluster Counting



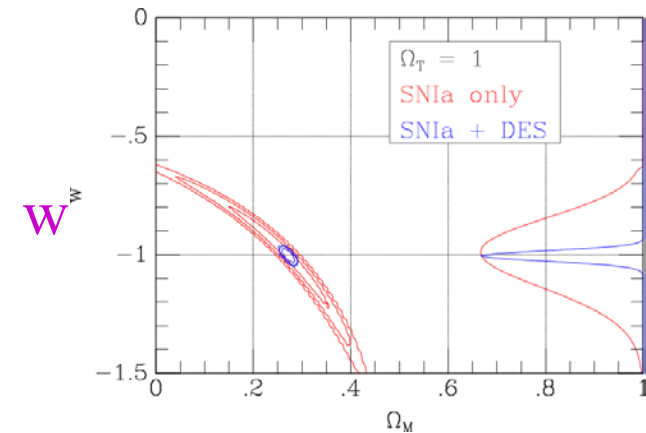
Ω_M

Weak Lensing



Ω_{DE}

Supernova



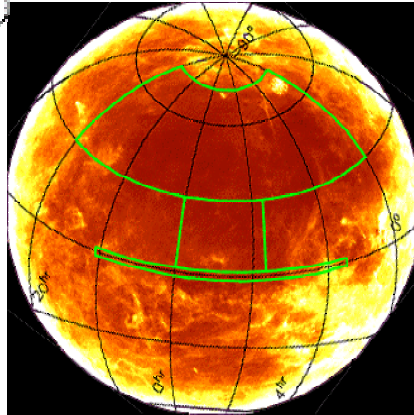
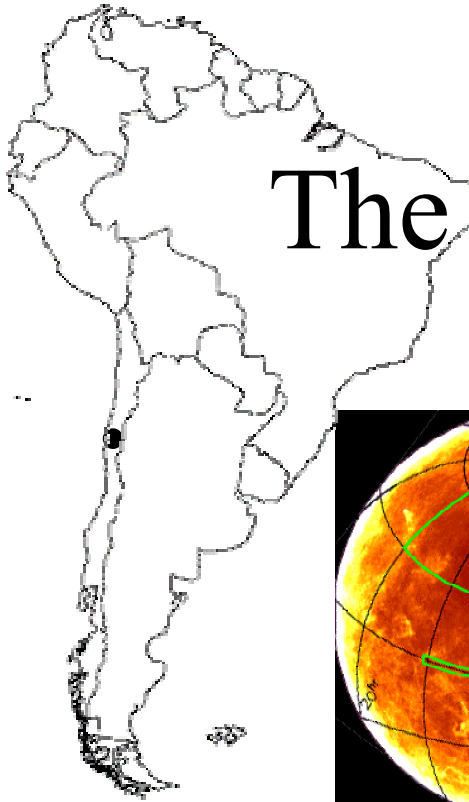
Ω_M

$\delta w \sim 5\%$ and $\delta \Omega_{DE} \sim 3\%$

The Planck satellite will provide tighter input CMB measurements, and the constraints will improve slightly.

Joint constraints on w and w_a are promising: initial results suggest $w_a \sim 0.5$

The Dark Energy Survey



- We propose to make precision measurements of Dark Energy
 - Cluster counting, weak lensing and supernovae
 - Independent measurements
- by mapping the cosmological density field to $z=1$
 - Measuring 300 million galaxies
 - Spread over 5000 sq-degrees
- using new instrumentation of our own design.
 - 500 Megapixel camera
 - 2.1 degree field of view corrector
 - Install on the existing CTIO 4m

