

# Supernova/Acceleration Probe

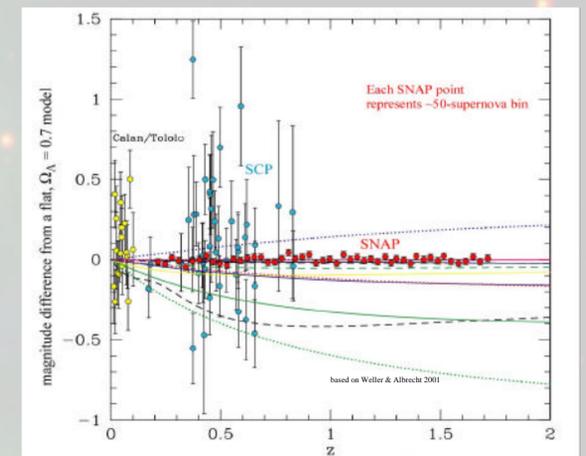


<http://snap.lbl.gov>

*Uncovering Cosmology and Fundamental Physics*

## The Nature of Dark Energy:

- The expansion of the universe is accelerating
- ~70% of the energy density acts like a cosmological constant  $\Lambda$ .
  - Vacuum energy? Scalar Field?
  - Modified gravity?
  - Extra dimensions?

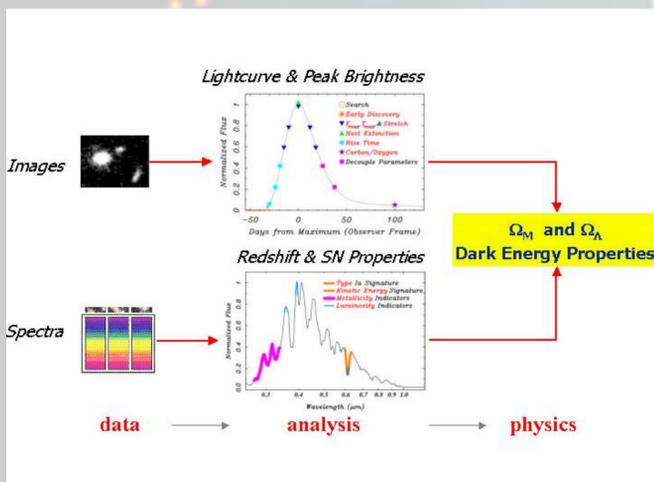


SNAP explores dark energy using a

- Simple, dedicated instrument
  - 2 meter telescope in space
  - 4 year+ experiment (with Guest Survey)
  - Observations giving tight systematics control
- Supernovae Survey: 2000 Type Ia supernovae to  $z=1.7$ . 9000 times the area of the Hubble Deep Field, and as deep!

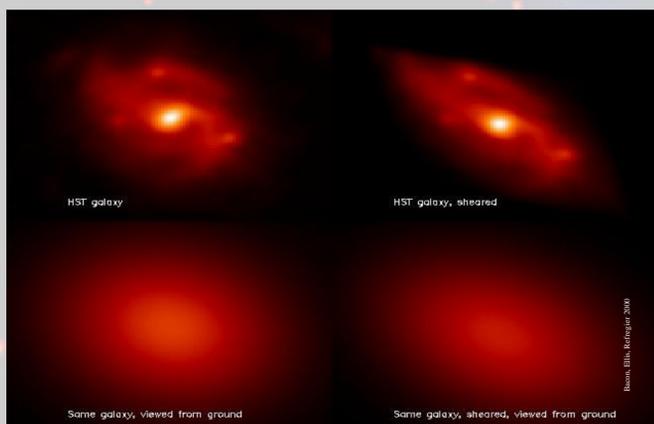
## The Instruments:

- Focal plane like a HEP detector, larger than any astronomical camera, smaller than vertex detector
- 600 million pixels
- Optical LBNL CCDs + near infrared devices 0.35-1.7  $\mu\text{m}$
- Low noise, high QE detectors
- Spectrograph covering optical and near infrared



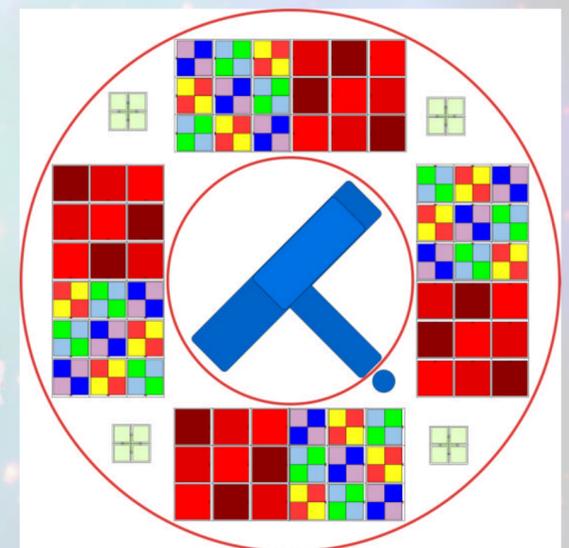
SNAP explores dark matter through gravitational lensing

- Lensing Survey: Wide area weak lensing over ~300 sq. deg.



## SNAP will:

- Determine the dark energy density  $W_{DE}$ , its equation of state  $w$ , and dynamical physics of  $w' = dw/dz$
- Map the expansion history  $a(t)$ , probing dark energy, higher dimensions, or alternative gravity
- Map the dark matter in a wide field thru weak lensing, tracing the matter power spectrum  $P_k$



Annular focal plane: 567 mm diameter = 1.49 deg  
9 filters (colors are only illustrative)