Supernova/Acceleration Probe:
A Dark Energy Mission Overview

http://snap.lbl.gov

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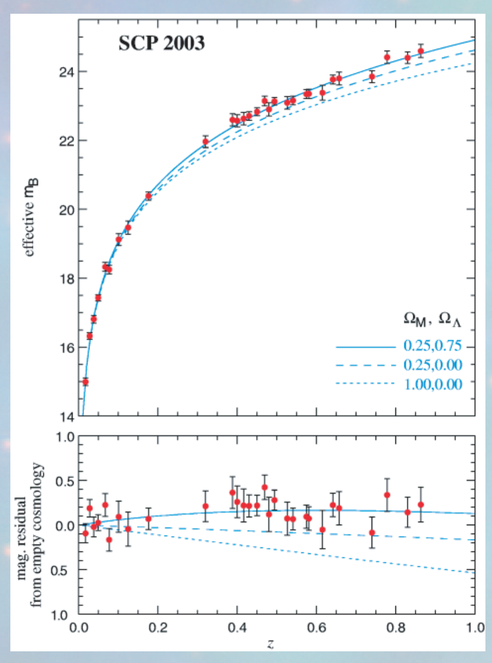
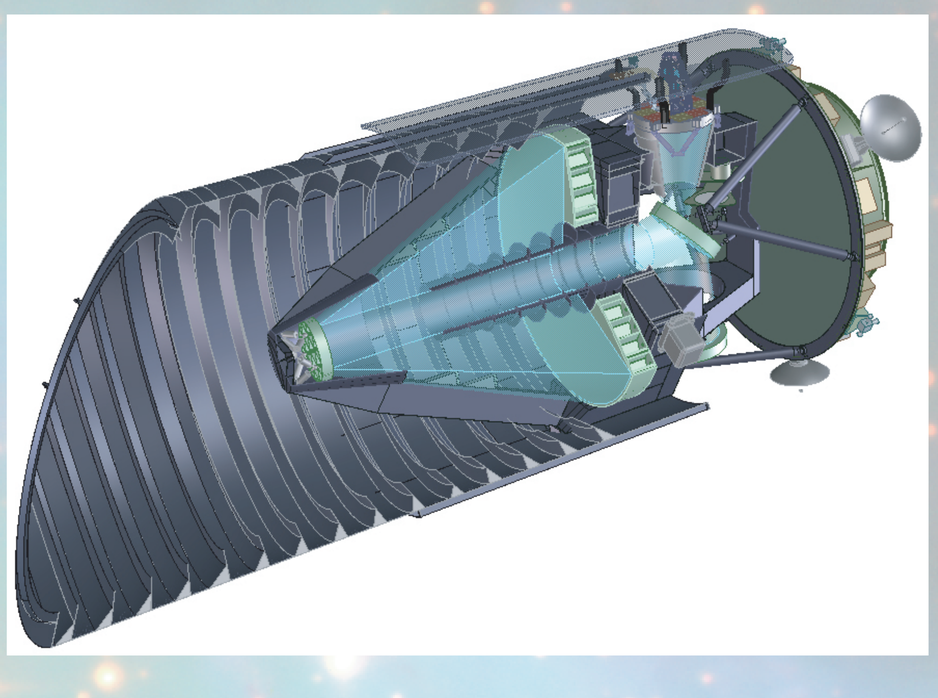
Motivation for SNAP — Investigating Dark Energy and More



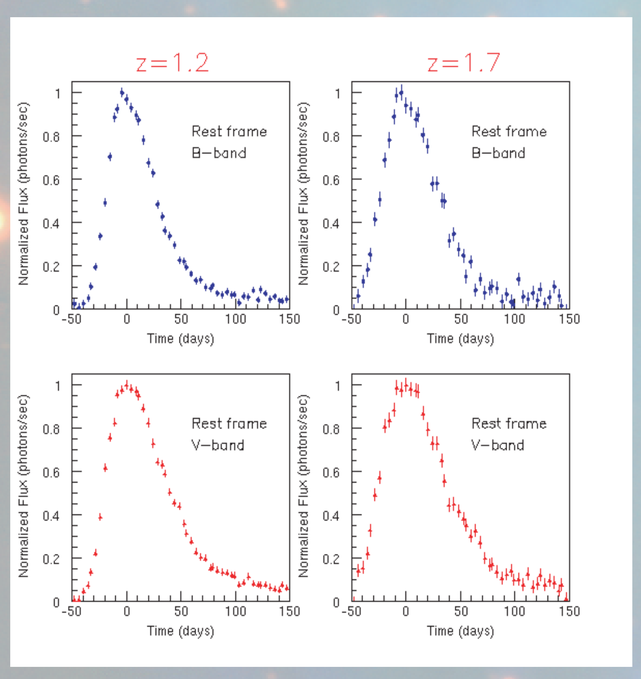
- Supernova measurements from the Supernova Cosmology Project (SCP) and the High-***z*** Team discovered that the Universe's expansion is accelerating. Evidence for this has now been strengthened by CMB, large scale structure, and new supernova data.
- This discovery implies the existence of a new energy component named dark energy. SNAP is a dedicated satellite mission designed to measure its properties with an unprecedented precision.
- Following the strategy that led to the discovery of the accelerating Universe, SNAP will discover thousands of Type Ia supernovae and measure them in detail.
- SNAP's wide-field lensing surveys will provide independent and complementary constraints on cosmology, as well as dark matter maps.

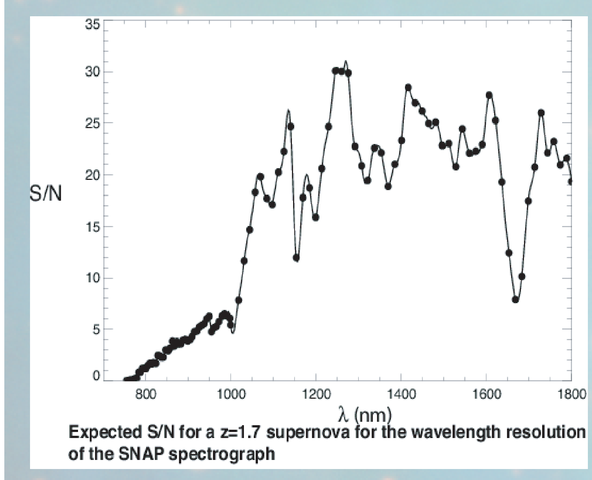
The SNAP Mission

- The baseline experiment is based on a simple, dedicated combination of a 2.0-m telescope, a 0.7-sq. deg. optical-NIR imager, and a spectrograph covering the 0.35 - 1.7 μm wavelength range.
- The baseline mission dedicated to dark energy will be followed by a Guest Survey Program using the instrument capabilities.
- The supernova survey program involves observing 15 sq. deg. of sky in 9 filters (optical and NIR) every 4 days to obtain precision measurements of ~2,000 Type Ia supernovae to ***z*** = 1.7. There will be targeted spectrographic follow-up of the discovered supernovae.
- The wide-area weak lensing survey covers hundreds of square degrees down to 27.5 AB magnitudes in each filter.



Expected Data Quality

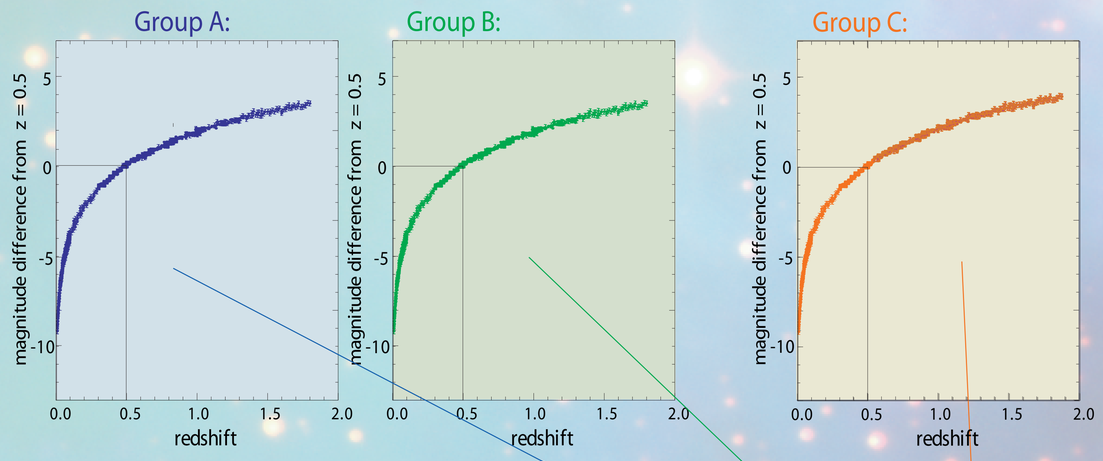


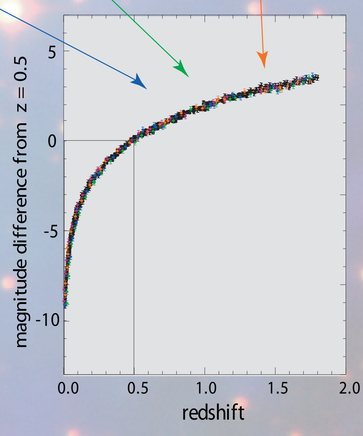


Expected S/N for a z=1.7 supernova for the wavelength resolution of the SNAP spectrograph

- Extensive trade studies and simulations resulted in the baseline SNAP design capable of fulfilling dark energy goals.
- Optimization and refinement of the design are ongoing.

Supernova Hubble Diagrams





- Comprehensive supernova data make it possible to empirically divide the supernova sample into well-defined subsets (schematically denoted above as Group A, Group B, ***etc.***). Such like-to-like comparisons allow correction for population drift (evolution).
- For each subset, we can construct, cross-check, and combine independent Hubble diagrams with the expected residual systematics at the level of ~1% in distance (0.02 mag).

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