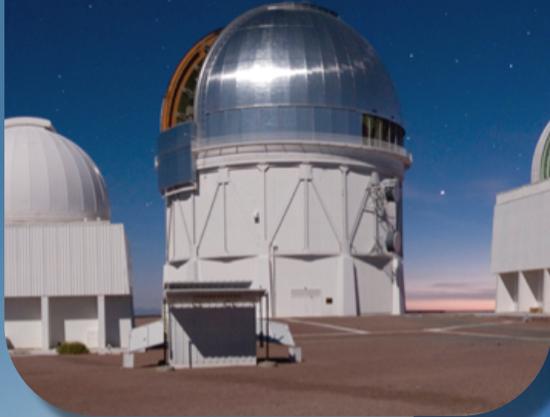




# NOAO Input

David Silva, NOAO Director



Dark Energy Survey

The Ground-Based Stage IV BAO Experiment

# BigBOSS

# LSST

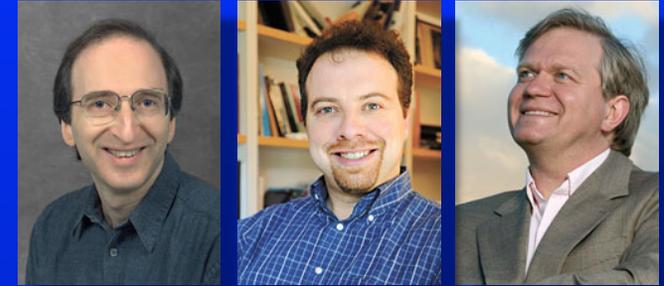
*Large Synoptic Survey Telescope*



# 2011 Nobel Prize in Physics

## A model for system approach to “big problems”

- Laureates: Perlmutter, Reiss, and Schmidt
- **NOAO/CTIO Blanco 4-m (Chile)** used to find distant supernova candidates
  - Much follow up SN light curve data from **NOAO/KPNO (Arizona)** (esp. WIYN 3.5-m)
- Spectroscopic confirmation done with Keck, MMT, ESO 3.6-m
- **NOAO astronomers were team members**
  - Phillips, Schommer, Smith, Suntzeff
  - Matheson (then UCB, now NOAO)
- Much supported by NSF grant program
- **NOAO facilities** and Chilean colleagues played critical roles in supernova light-curve – luminosity calibration





## Dark Energy Survey NOAO Blanco 4-m (Chile)

- 2003: NOAO creates opportunity @ Blanco
- 2004: DES/DECam accepted as new, major partner
- 2012: DES begins
- FNAL, NCSA, and NOAO are Lead Institutions
  - Committed to delivery of systems **and** science (see MOU)
  - NOAO has invested \$8M+ from NSF base funding to-date
- At least five observing seasons (2013 – 2017)
- Five years of general DECam use **after** DES completion stipulated by MOU (2018 – 2022)
- **Blanco top-end change is highly undesirable before 2022** (if ever) as would terminate DECam use before end of current MOU
- Using Blanco **more than 100 nights a year for DOE-funded surveys** seen as **highly undesirable** by astronomical user community



## Beyond DES NOAO Blanco 4-m (Chile)

- In LSST era (2020s), NOAO/Blanco envisioned to commit large fraction of time to LSST follow up observations
  - See, e.g. NSF Astronomy Portfolio Review
- Phase 1: clarify LSST follow up strategy for Blanco and others
  - Now to 2017/2018, i.e. 5 years before LSST survey start
  - Time-domain event triggers? Wide-field spectroscopy?
  - Wide-field spectroscopy on 4-m not optimal for LSST 6.7-m?
- Phase 2: build / implement prescribed capabilities/processes
  - Happens during 5 years before LSST survey start
- NOAO (and NSF?) believes any major post-DES investment in Blanco should be consistent with LSST follow up strategy
  - Not necessarily exclusively so



# BigBOSS

## NOAO Mayall 4-m (Arizona)

- **NOAO and BigBOSS have an established partnership**
  - 2009-11 = initial Announcement of Opportunity from NOAO
  - 2010-10 = BB proposal received
  - 2010-11 = Non-advocate review (“Schmidt committee”)
  - 2011-01 = NOAO accepts proposal, begins collaboration
  - 2011-12 = DOE review (very favorable)
  - 2012-10 = DOE CD-0 for massive spectroscopic survey



# BigBOSS

## NOAO Mayall 4-m (Arizona)

- Since 2011 January, NOAO and BB team **actively working together** on project management, system engineering, interface specification and control, data management, Mayall modification definition, etc.
- NOAO process slowed down by NSF Portfolio Review but BB continues to be **high priority for AURA, NOAO, and community**
- **NSF Astronomy has signaled “flexibility”** towards some TBD Federal / non-Federal / private partnership
- NOAO seeks a model where BigBOSS Collaboration and the community-at-large **share use of Mayall+BigBOSS system** over five (5) years or longer, funding provided



## DESPEC NOAO Blanco 4-m (Chile)

- **NOAO is aware of DESpec concept but...**
  - No significant scientific or technical dialogue exists between NOAO and DESpec team at this time
  - Our internal focus is LSST, DES/DECam success & BigBOSS development
  - No current plans for new major partnership at Blanco but not adverse to that possibility
- **A massive parallel spectrometer at Blanco seems very attractive** but would require real discussion, real proposal, and fit within context of LSST follow up mission
- Would **require an in-depth non-advocate review** (a la Schmidt committee) before real partnership could commence



# LSST NOAO involvement

## LSST is our highest priority forward-looking project

- One of four Founding Partners
  - NOAO, U. Arizona, U. Washington, Research Corp.
- Member of LSST Inc. Board of Directors and AURA management oversight committee for LSST construction project
- Lead Institution for Telescope and Site Facilities
- Will operate LSST facilities in Chile for LSST Project
- NOAO LSST Community Science Center under development as joint NOAO / LSST Inc. enterprise



## Final Thoughts

What does NOAO want? Both, of course...

- BigBOSS @ Mayall
  - Go as fast as possible, get on sky, make significant survey progress before 2020 for dark energy and other topics
  - Operate as joint DOE / community research facility with funding from DOE, community, and (hopefully) NSF to enable dark energy “key project” as well as a plethora of other projects
  - Flexibility from NSF to allow NOAO, BB, and community to develop creative operations and funding model that minimizes cost to NSF
- DESpec @ Blanco
  - Further developed with LSST and astronomical research contexts in mind (e.g. more versatile BB spectrographs)
  - Strong proposal, aligned with LSST, good non-advocate review
  - Deployment later in decade after DES substantially completed and community use of DECam declining