

# Science, Instrumentation, and Survey Priorities for CCAT



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- Emphasize politics over science for this discussion
  - How do you conduct productive surveys of broad utility within the context of a large consortium with disparate objectives – some strongly proprietary?
  - How do private institutions combine to overcome proprietary desires to serve the public good (and thus MAXIMIZE) the science output?

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- Been there done that...
  - 1990 – 2003 2MASS all-sky catalogs and images 1-2.5um
  - 1997 - 2012+ WISE all-sky catalogs and images 3-30um
  - 2008 – 2014+ APOGEE/SDSS-III 100,000 R=30,000 1.6um spectra



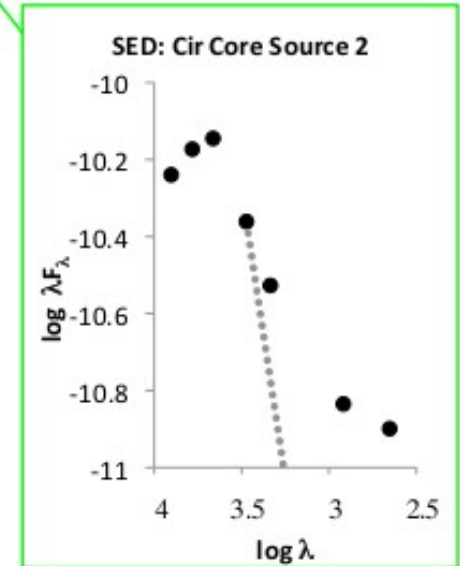
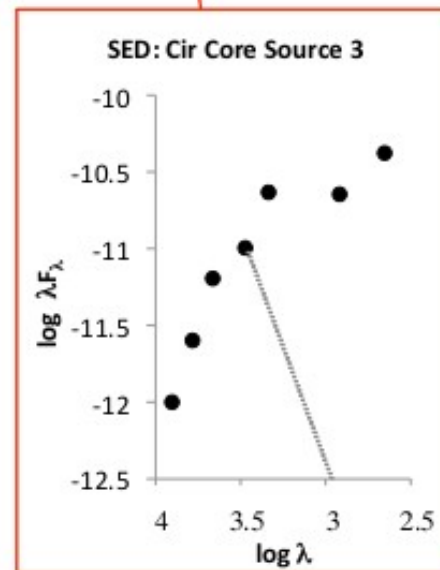
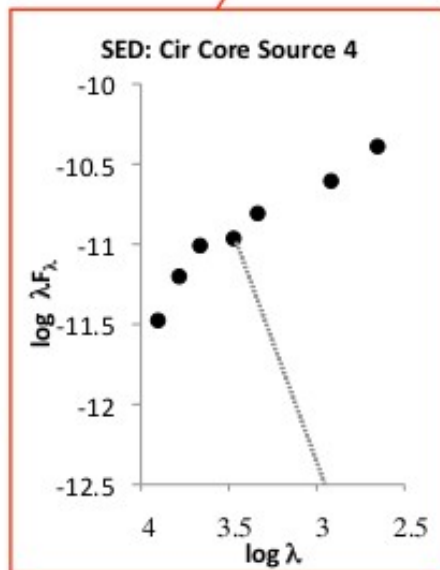
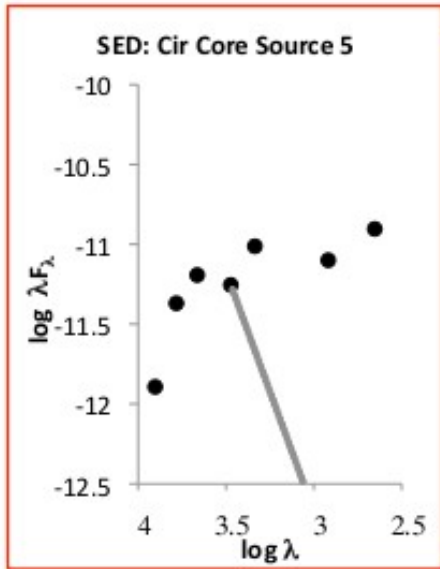
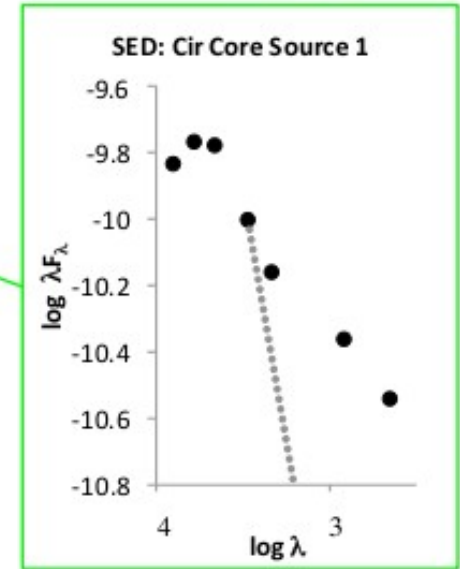
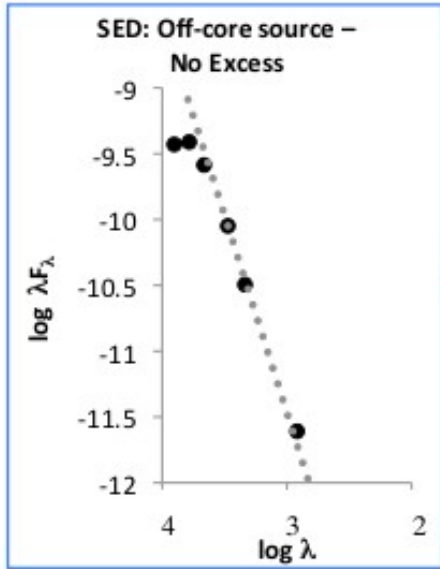
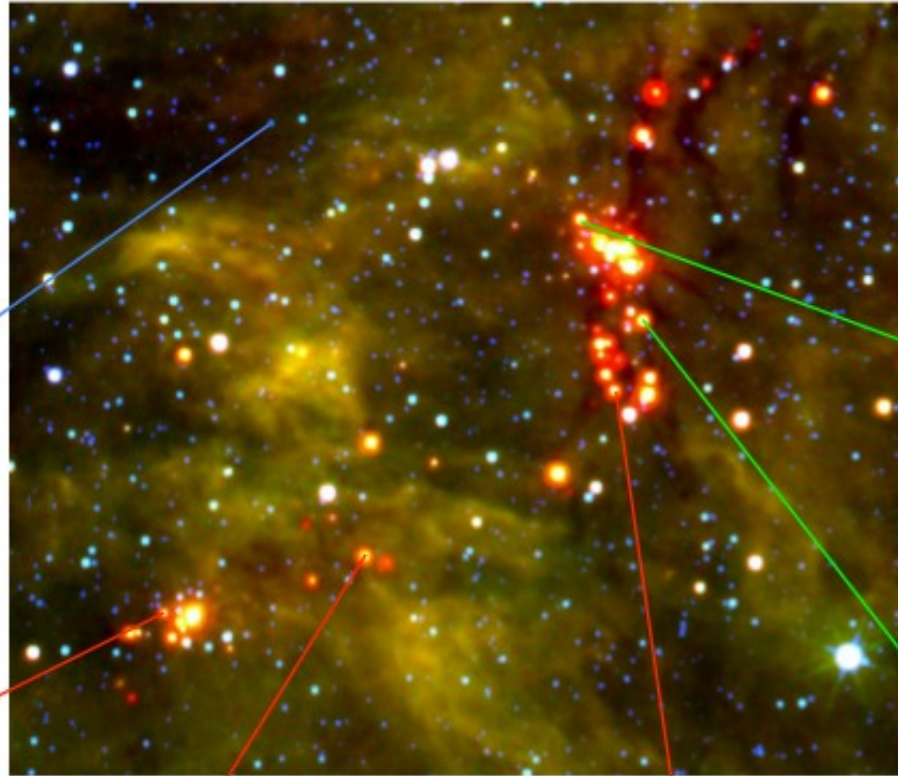


½ sky imagery and high SNR source extractions --  
available April 2011

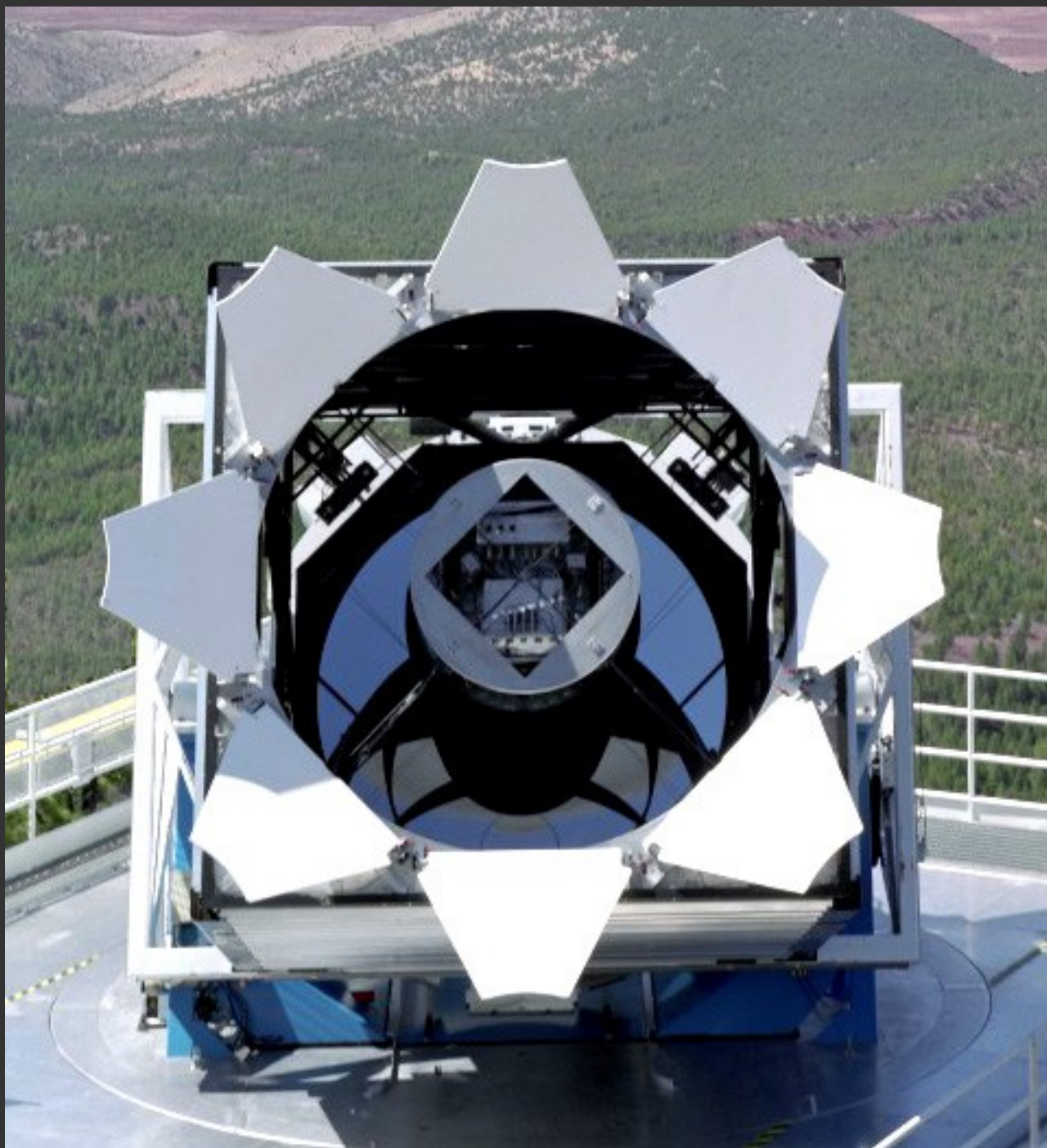
Full-sky to SNR limits of survey mid-2012



# Circinus Core - SEDs

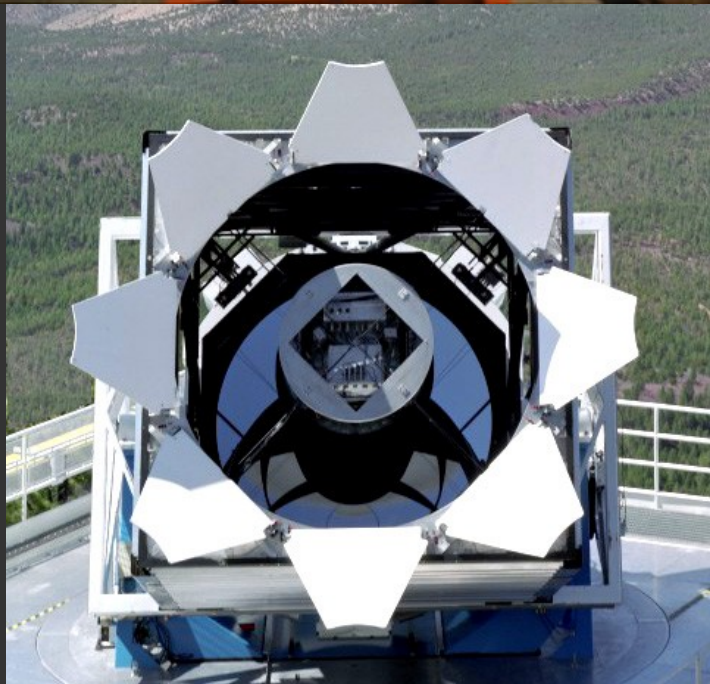


# CCAT vs. SDSS





# CCAT is SDSS



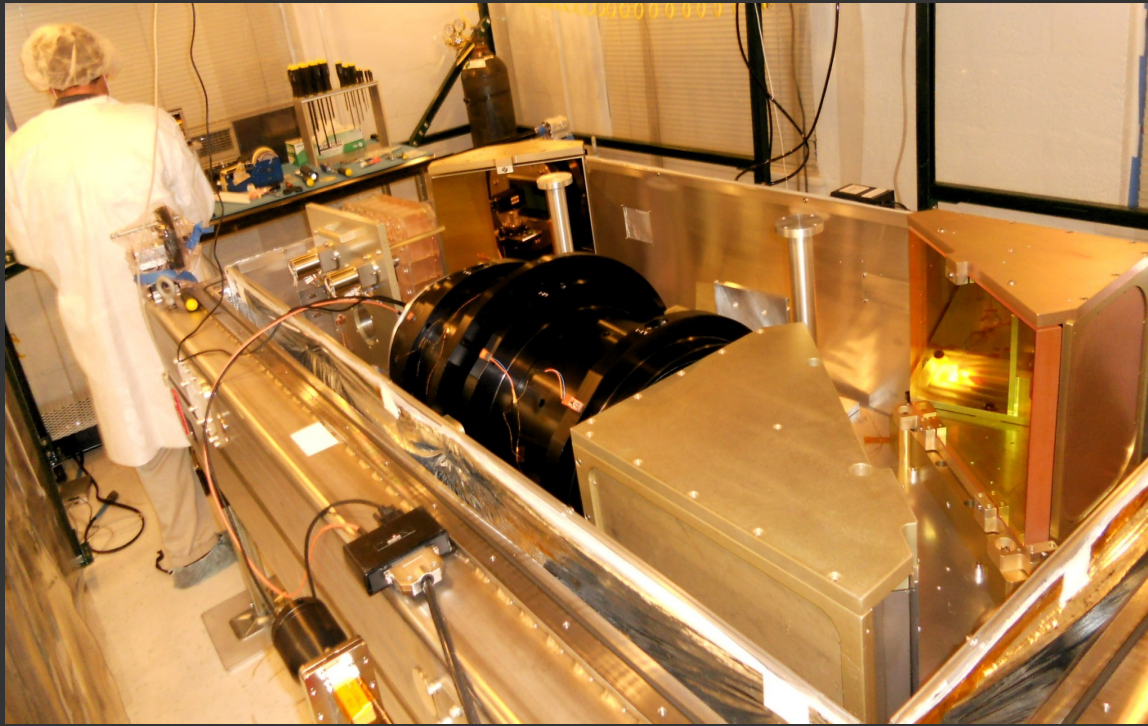


# Evolution of SDSS

- SDSS-I
  - ◊ Foundation imaging survey (~10,000 square degrees)
  - ◊ Broadly targeted spectroscopic survey – galactic....extragalactic
- ◊ SDSS-II
  - ◊ Additional supplementary imaging, spectroscopy
    - ◊ A continuation of SDSS-I
  - ◊ SEGUE – a near galactic plane survey with focused science objective
    - ◊ Imaging and spectroscopy
  - ◊ Overall a greater emphasis on spectroscopy

# Evolution of SDSS

- SDSS-III
  - ♦ Four **spectroscopic** surveys and the first new SDSS instruments
    - ♦ SEGUE-II – more galactic spectroscopy
    - ♦ MARVELS – multi-object planet finder, i.e. spectroscopy
    - ♦ BOSS – Baryon Oscillations to greater  $z$  with an upgraded spectrograph
    - ♦ APOGEE – Galactic cosmochemistry with a new 1.5-1.7 $\mu\text{m}$  spectrograph.
      - ♦ 2MASS is the pointing catalog





# Why Won't SDSS Die?

- Only two new instruments and one upgraded instrument in 15 years.
  - .... yet SDSS-IV is under development
- The answer... a uniquely large field-of-view
  - 3 degree diameter, 7 square degrees
  - Room for 1000 fibers – now being realized
- Lesson – don't underscope initial field. Many major facilities now regret that the hole in their primary is too small.
- SDSS also lives on because the culture has evolved to rapid public distribution of high quality data products.

# To Think About....science

- What instrumentation choices today enable the most productive surveys long term?
  - What “full-field” surveys? spectroscopic/multi-object surveys?
  - What “supplemental” surveys – to add needed content to existing Herschel surveys, for example?
- What public surveys to unleash the community by enhancing ALMA opportunities?
  - What are the political/ownership consequences
- Think non-proprietary, both internally and in general
  - Be enabling of science, but take satisfaction in the productivity of the community
  - You WILL be rewarded....
    - SDSS passed through this same evolutionary sequence.
    - 2MASS and WISE started there.
    - Note the “pseuo-proprietary” opportunities that are available during public release preparation.



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