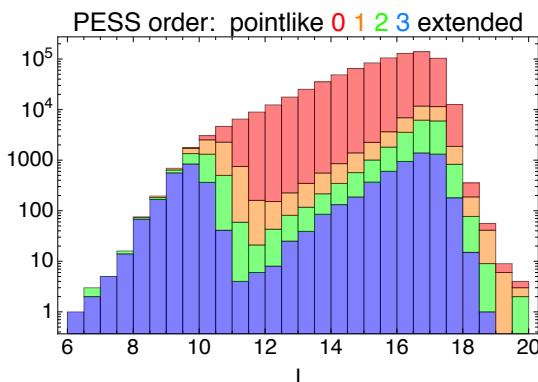
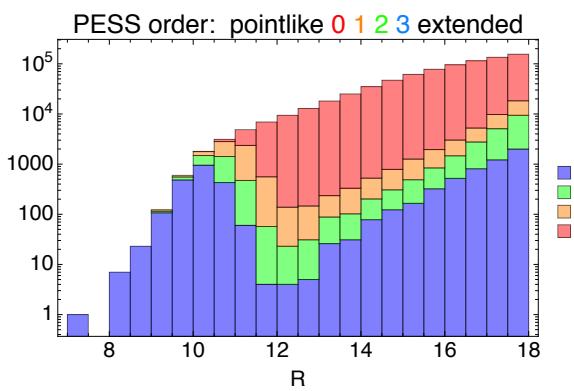
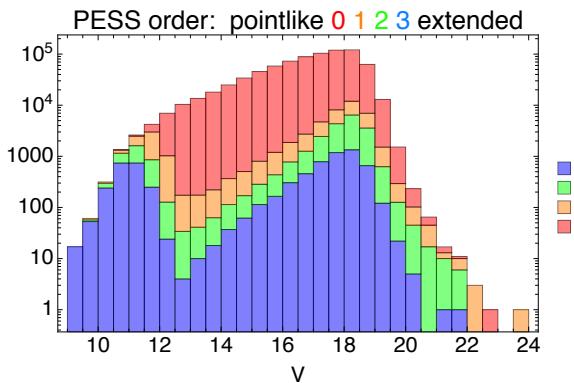


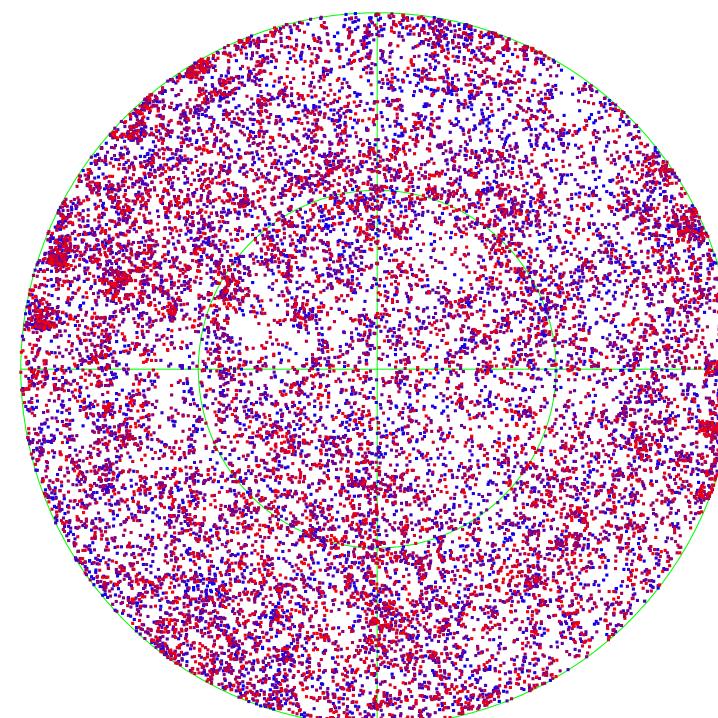
# **North Celestial Cap Redshift Survey**

# NCCS / star-galaxy separation

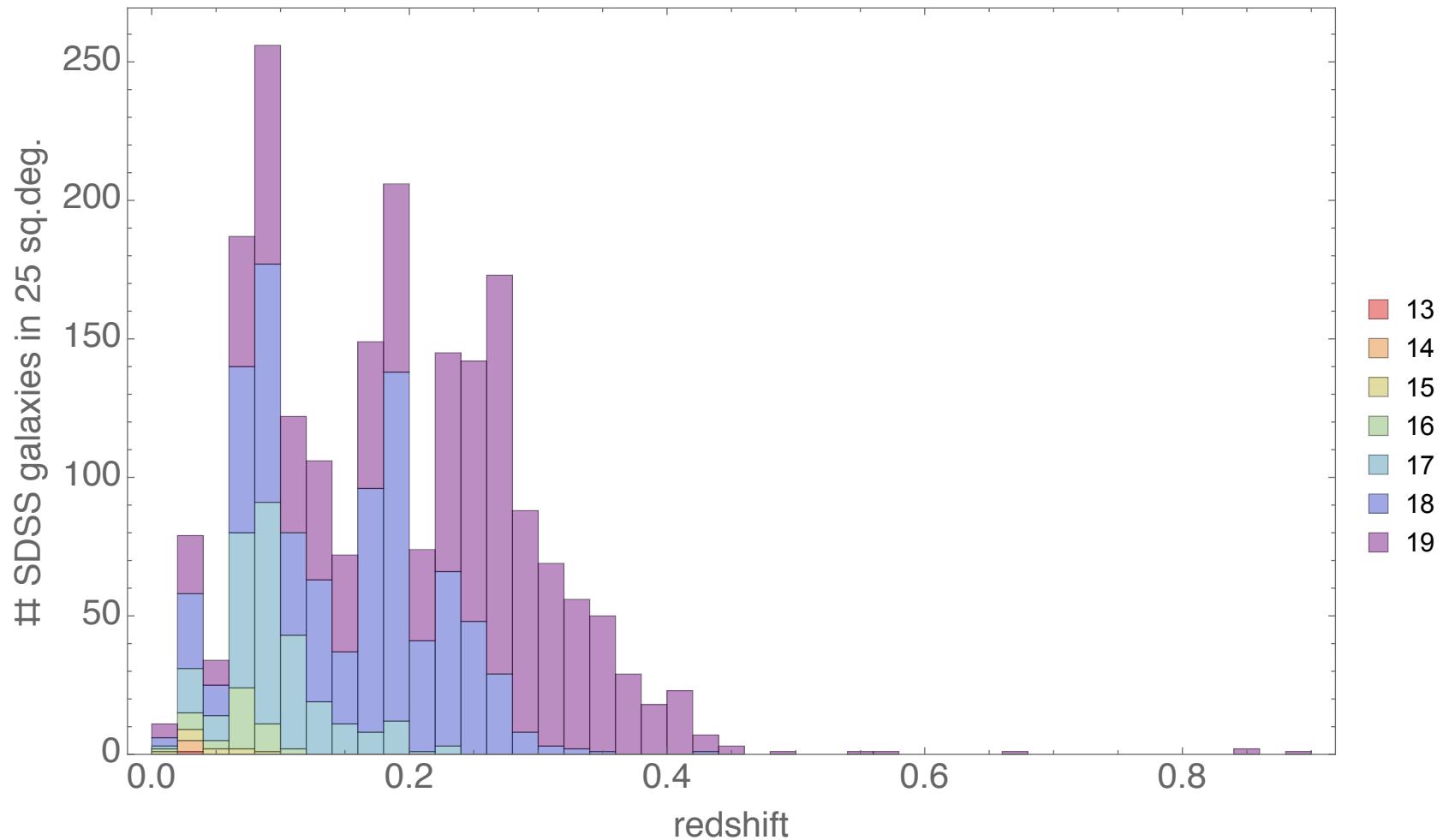


NCCS - North Celestial Cap Survey

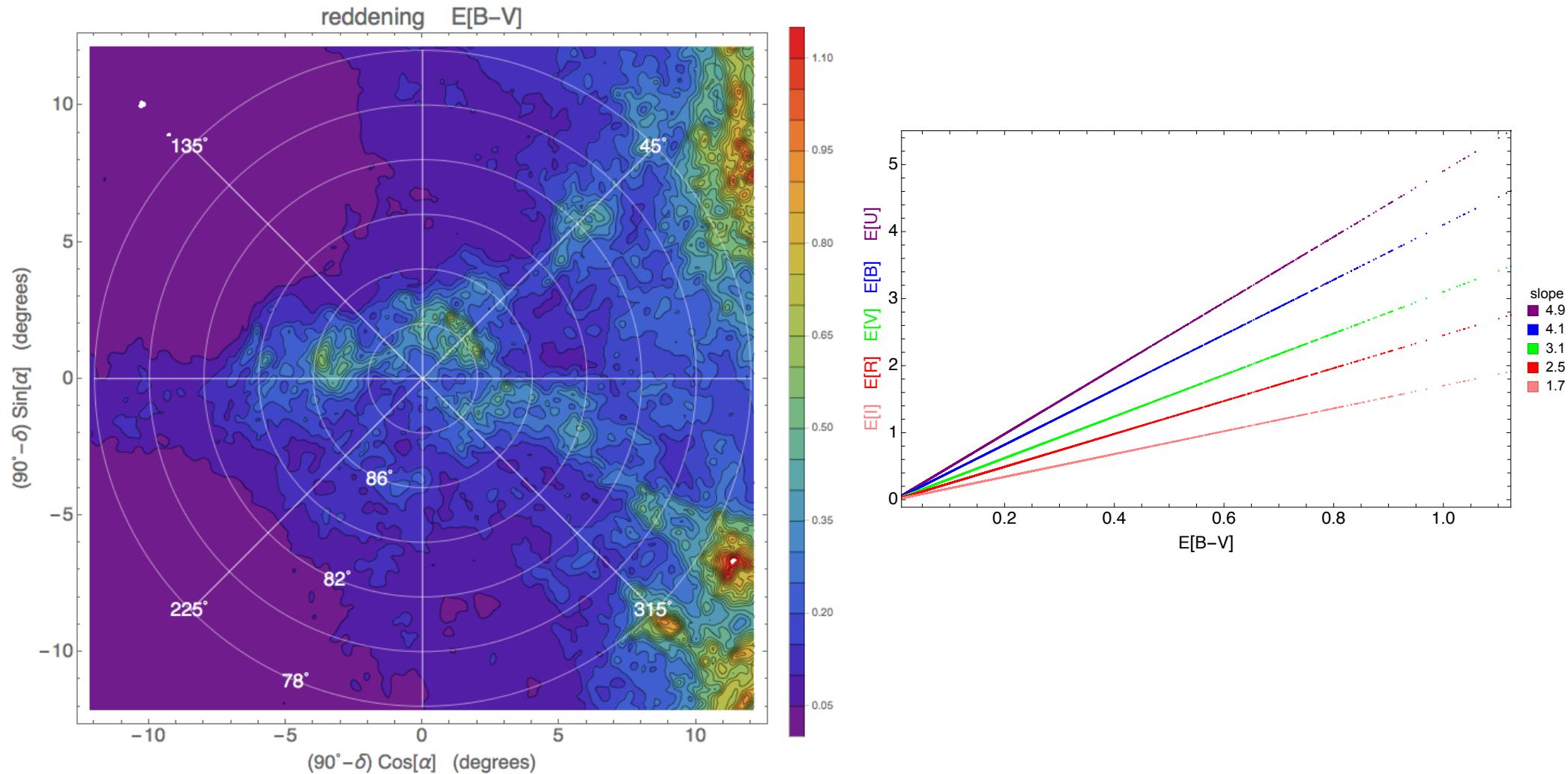
- 804,844 objects identified  $R \leq 18$
- 20,058  $12 \leq R \leq 18$ ,  $\delta > 80^\circ$ ,  $PESS \geq 2$
- 64 /sq.deg in 313 sq.deg



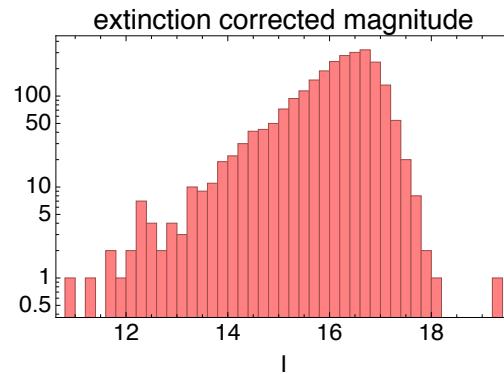
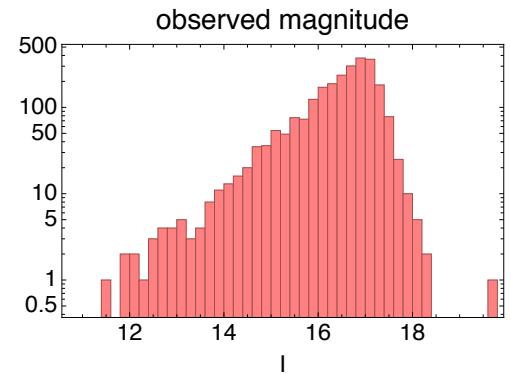
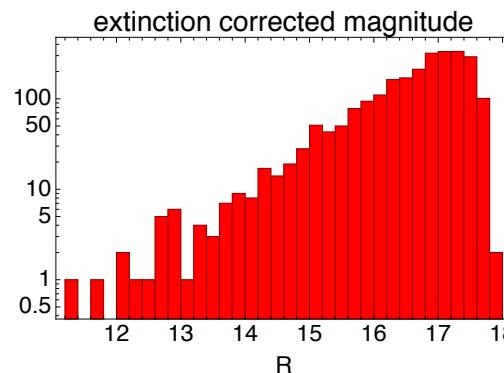
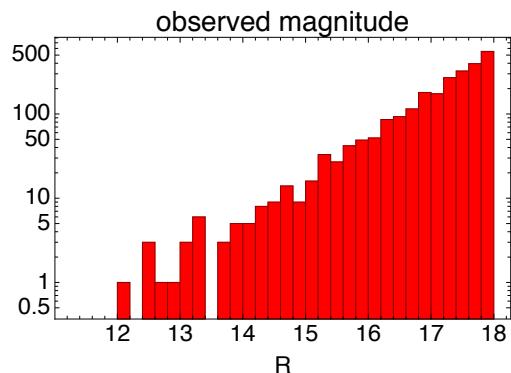
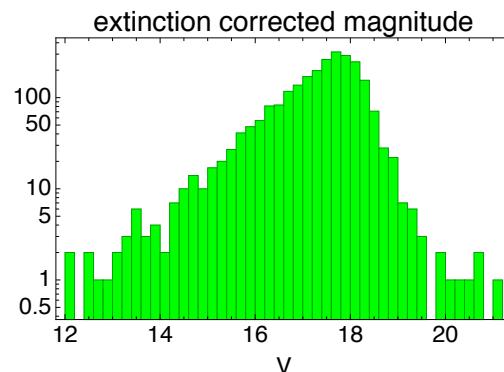
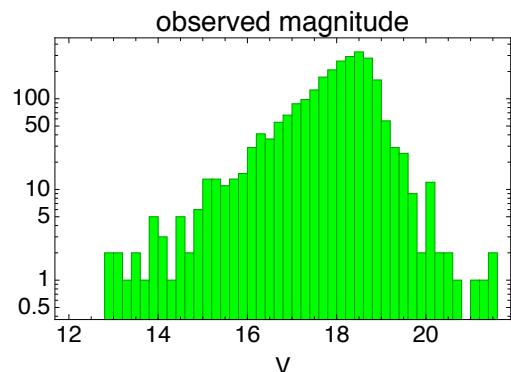
# SDSS magnitude redshift



# Reddening / Extinction

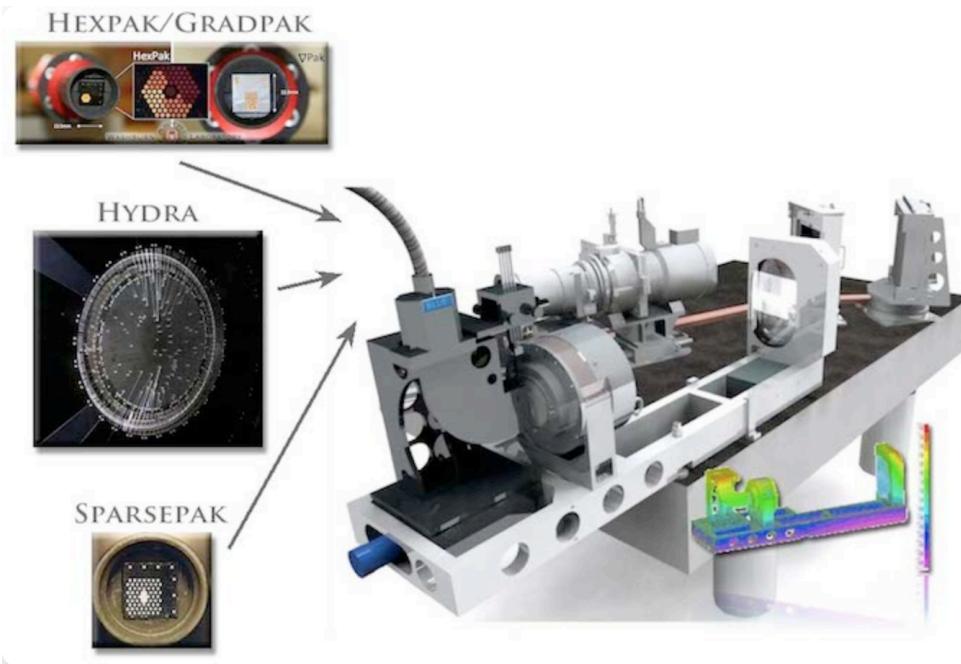


# Extinction

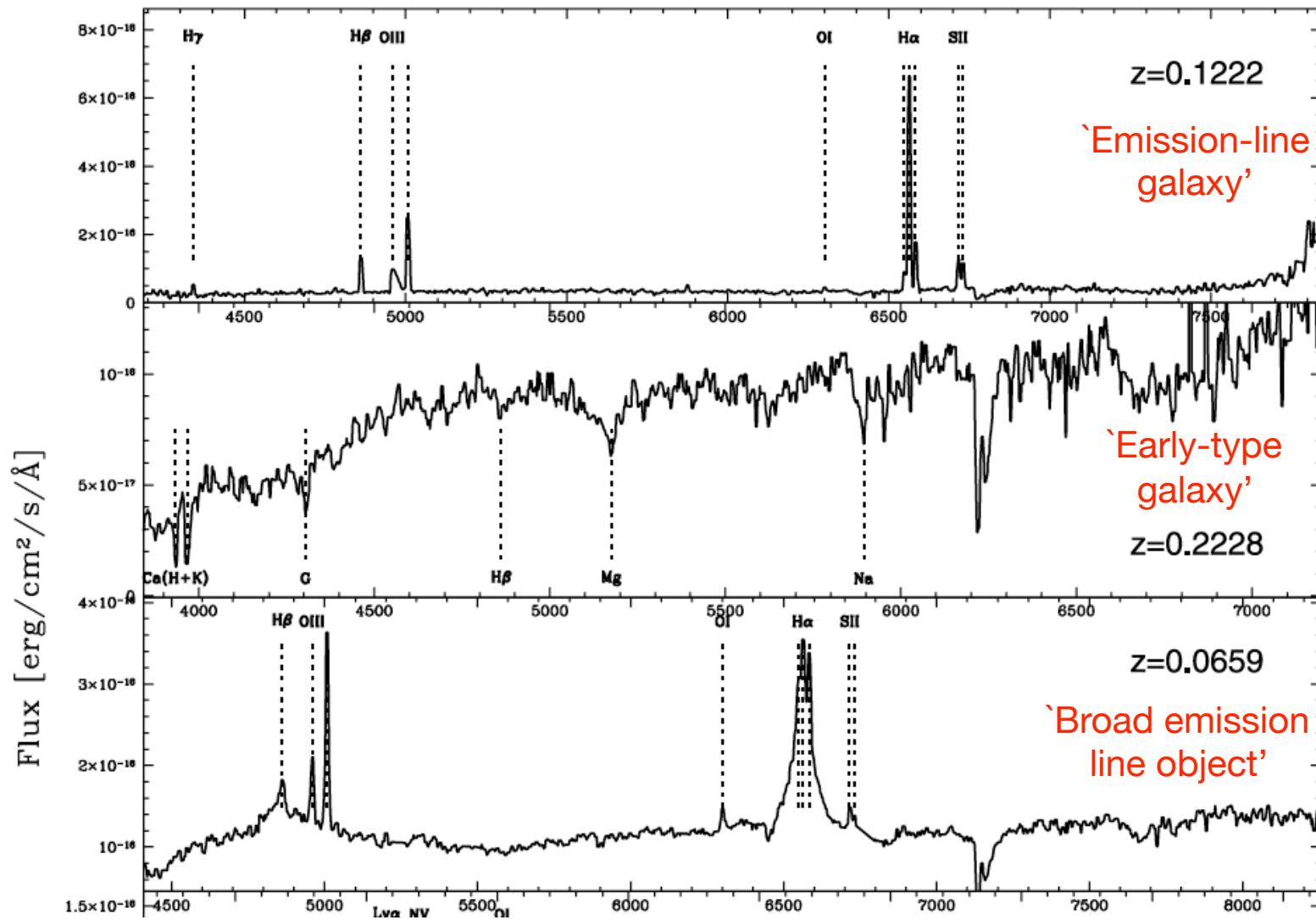


# WIYN Hydra Spectrograph

On 3.5 WIYN Telescope, Kitt Peak, NM  
Multi object spectrograph  
~ 100 fibers with automated positioner



SPECTROSCOPIC SURVEY OF 1.4 GHz AND 24  $\mu$ m  
SOURCES IN THE SPITZER FIRST LOOK SURVEY WITH  
WIYN HYDRA  
(Marleau et al. 2007)



## North Celestial Cap Redshift Survey (spectroscopic)

- need for cross-correlation with Tianlai Interferometer HI survey of NCP
  - first demonstration of HI intensity-mapping with *interferometer*
  - $0 > z > 0.07$
- targets selected using existing North Celestial Cap Survey (photometric)
- 64 extended objects/sq. deg. to 18th R magnitude
- 10 degree diameter field has 78 sq. deg. ==> 5000 objects
- observing NCP region from most candidate telescopes (Lat 30) gives  $\sim 1.8$  air masses
- spectroscopy over 4500 - 7000 Å gives spread in atmospheric refraction angle  $\sim 1''$

### 1) WIYN Hydra

- each 1 deg. dia. FoV has 50 targets +  $\sim 10$  reference objects = 60 fibers
- use ‘blue’ fibers, each 3.1” dia to minimize dispersion loss
- assume integration time to reach 18th mag is just a few seconds
  - Marleau et al (2007) survey to 23 mag took 3 x 20 minute exposures
- assume repositioning time for 60 fibers  $\sim 15$  minutes
  - repositioning takes 20-25 minutes for  $\sim 100$  fibers
- assume readout time for CCD (no binning)  $\sim 1$  minute for each exposure
- assume 2 exposures
- $\sim 17$  mins per FoV X 78 pointings = 22 hrs

### 2) Single-slit

- assume line up 2 sources at a time with roughly N-S oriented slit
- 5000 targets --> 2500 pointings/obs/readouts
- assume dominated by repointing time/ CCD readout time = 30 secs = 0.5 mins
- if 1 exposure per pointing, then  $2500 \times 0.5$  min = 1250 mins = 21 hrs
- if 2 exposures per pointing, then 42 hrs ...

## **Questions**

- how many exposures are needed (either single slit or Hydra)?
- will atmospheric refraction/dispersion mess up spectra so they don't match templates?