WIYN Spectroscopy

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Fermilab

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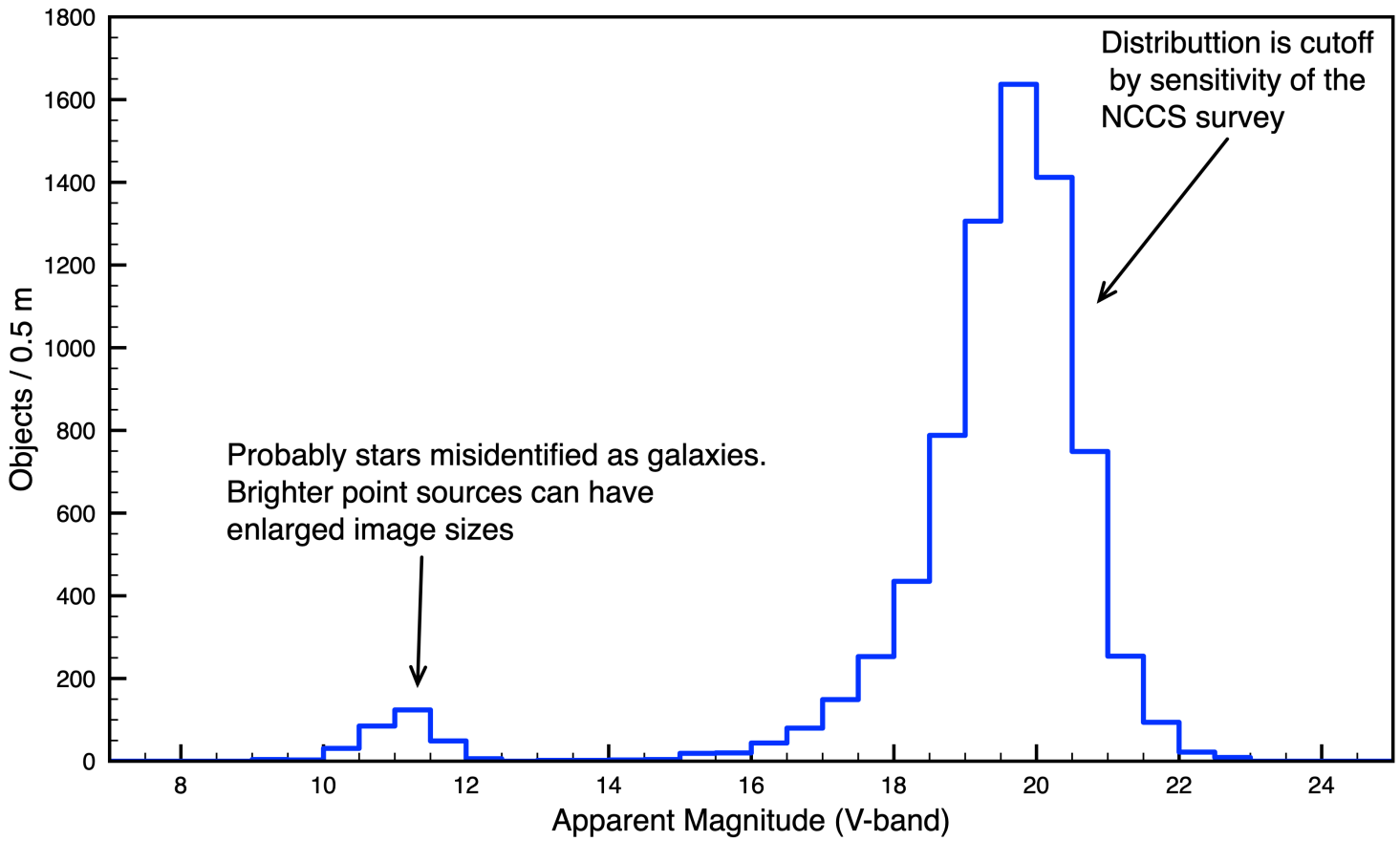
- Goal: Measure the redshift of all galaxies with dec>87 deg and z<0.07
- Technique: WIYN hydra, multi-object (~100) spectrograph
- Observing: Nov 21-22, 2020, Feb 1-2, 2021, Jun 11-12, 2021, Jun 15-16, 2021, Aug 1-2, 2021, Mar 7-9, 2022 (13 nights - mostly Tucker & students with some help from Marriner & Stebbins)
- Target selection: From NCCS Catalog (Tucker & students)
- Spectrum reduction: Special purpose code (Marriner)
- Spectrum analysis: Manual (Marriner)

NCCS Catalog - a VRI survey



Dec>87 degrees
pecc>=2
status=3

Some statistics

Targets are selected from the NCCS catalog with

m<19

Dec<87.0

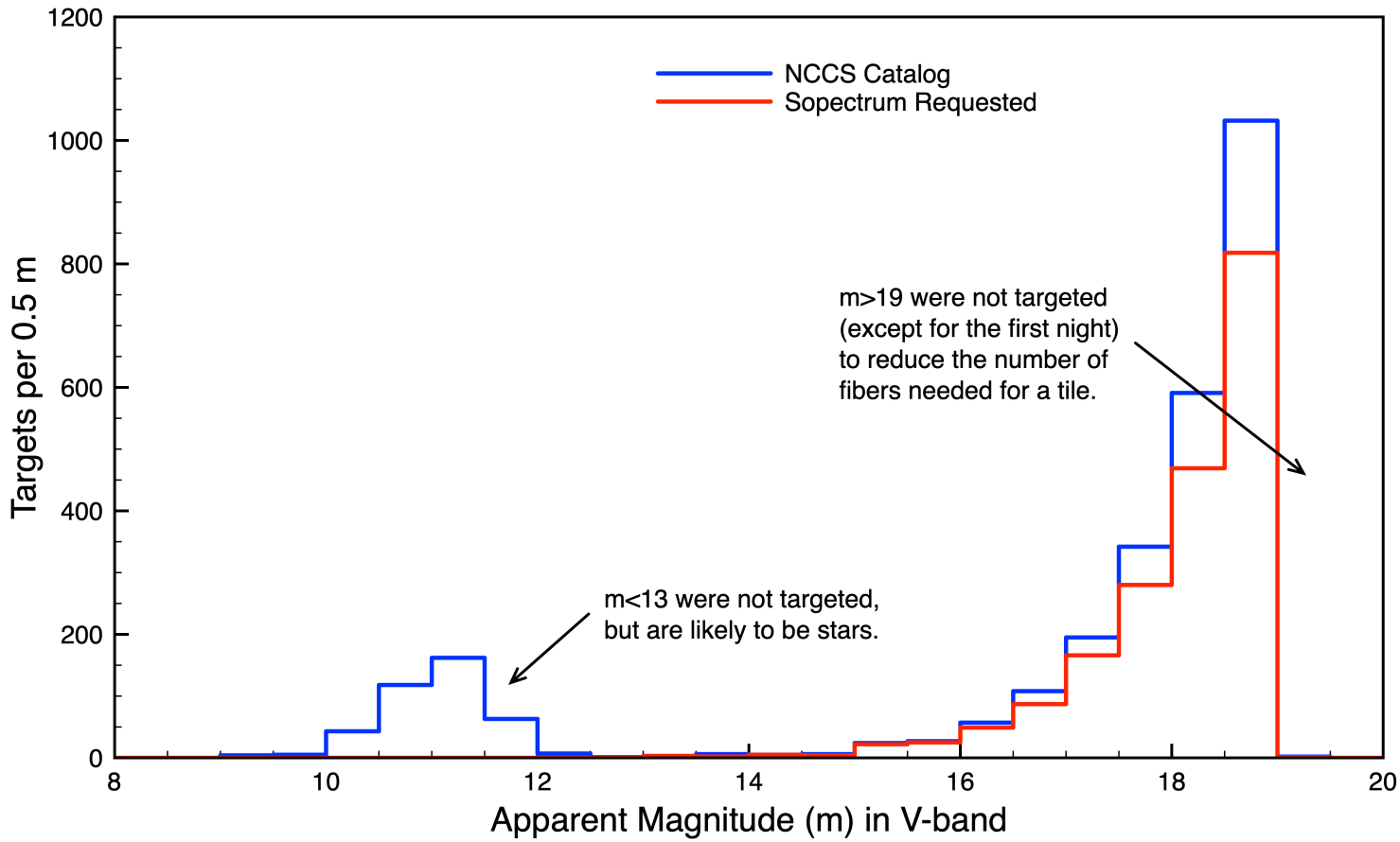
pecc>2

*Fiber requested in hydra file, but was not assigned on the telescope.

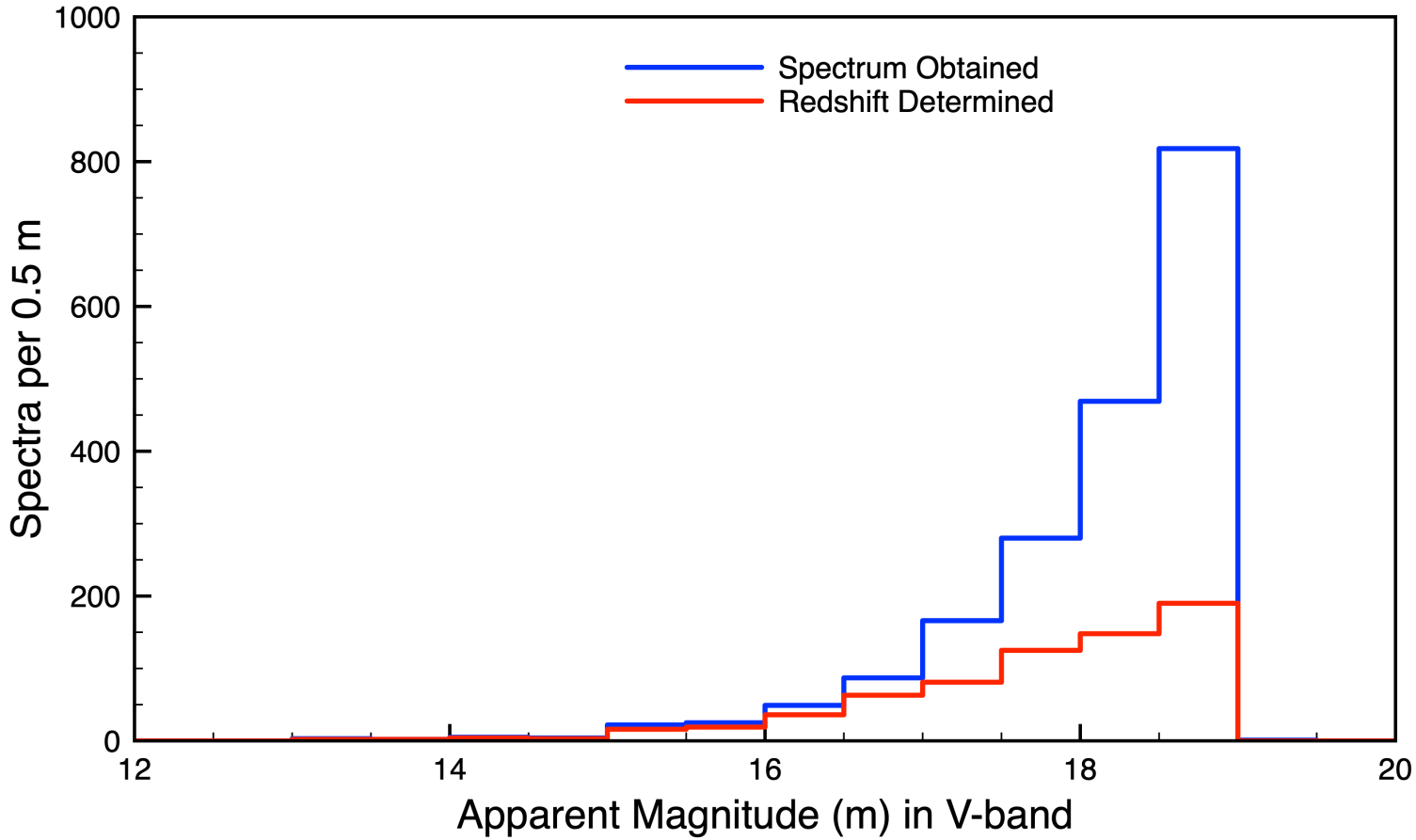
**Aperture 21 is listed as working in the hydra configuration file, but acts like a broken fiber.

	2021	2022
Targets	2801	2801
Never targeted	1184	870
Targets with m<13	403	403
Targets w/ spectra (attempts)	1617	1931
Targets with 2 spectra	56	105
Targets with 3 spectra	0	7
Fiber placement error*	33	56
Aperture 21 loss**	45	44
Unanalyzed	0	83
Targets w/ analyzable spectra	1539	1831

Target Magnitude Distribution



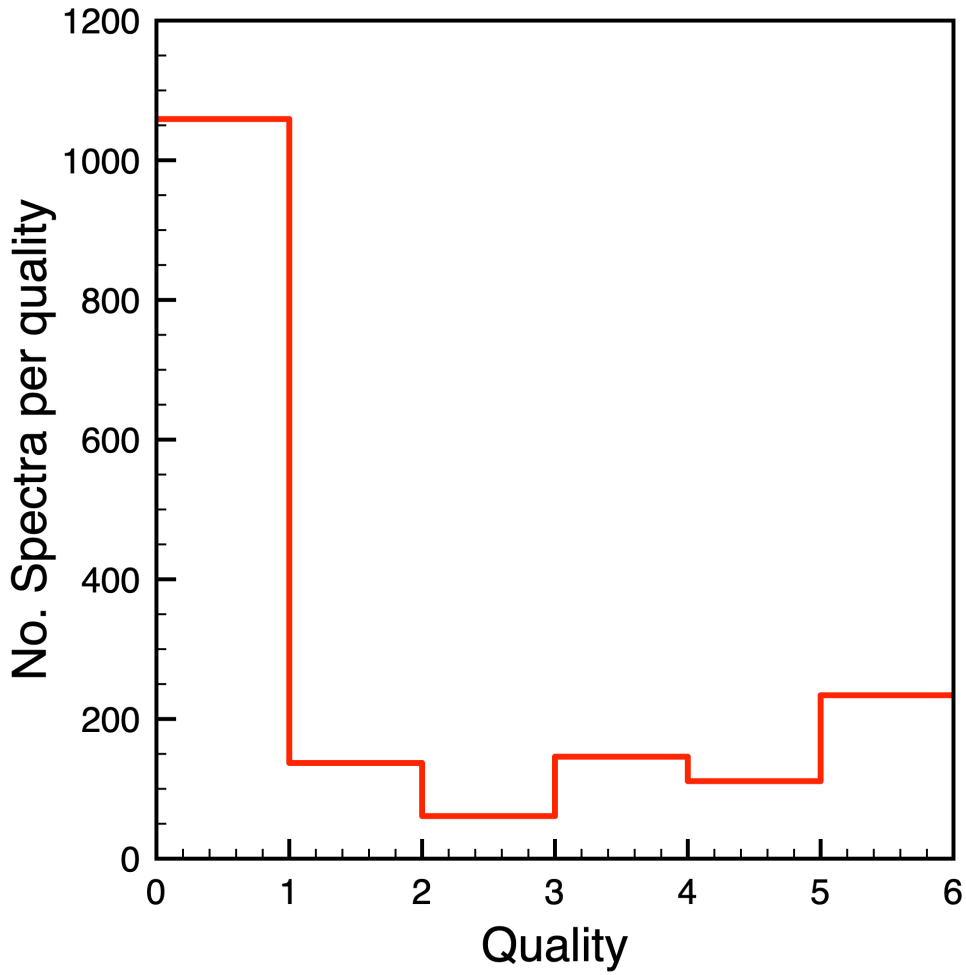
Spectrum Magnitude Distribution



Quality Distribution

Quality	Description (Misidentification
0*	No redshift
1	Possible redshift (50%)
2	Good guess (75%)
3	Good redshift (10%)
4	Solid redshift (1%)
5	Secure redshift (0%)

Featureless spectrum & low magnitude	348
Quality not given. Zero assumed	165

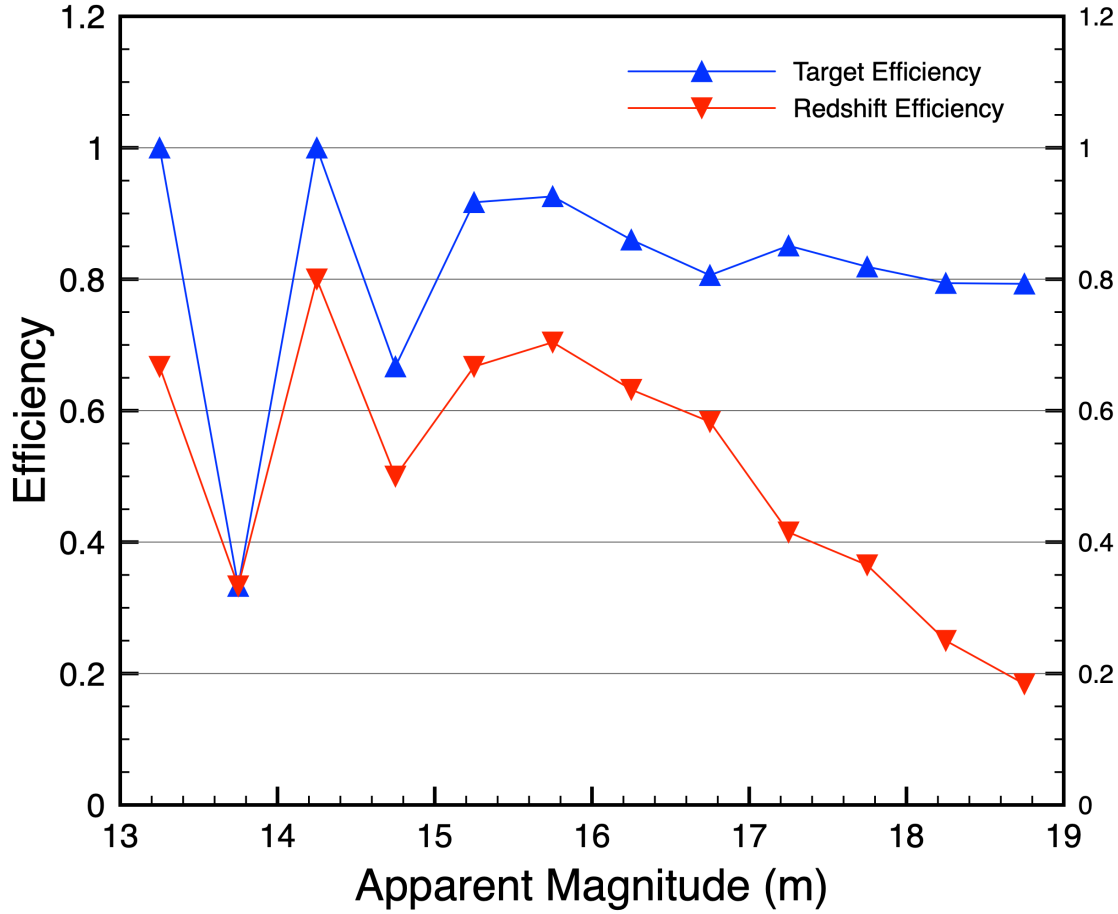


Targetting and Spectra Efficiencies

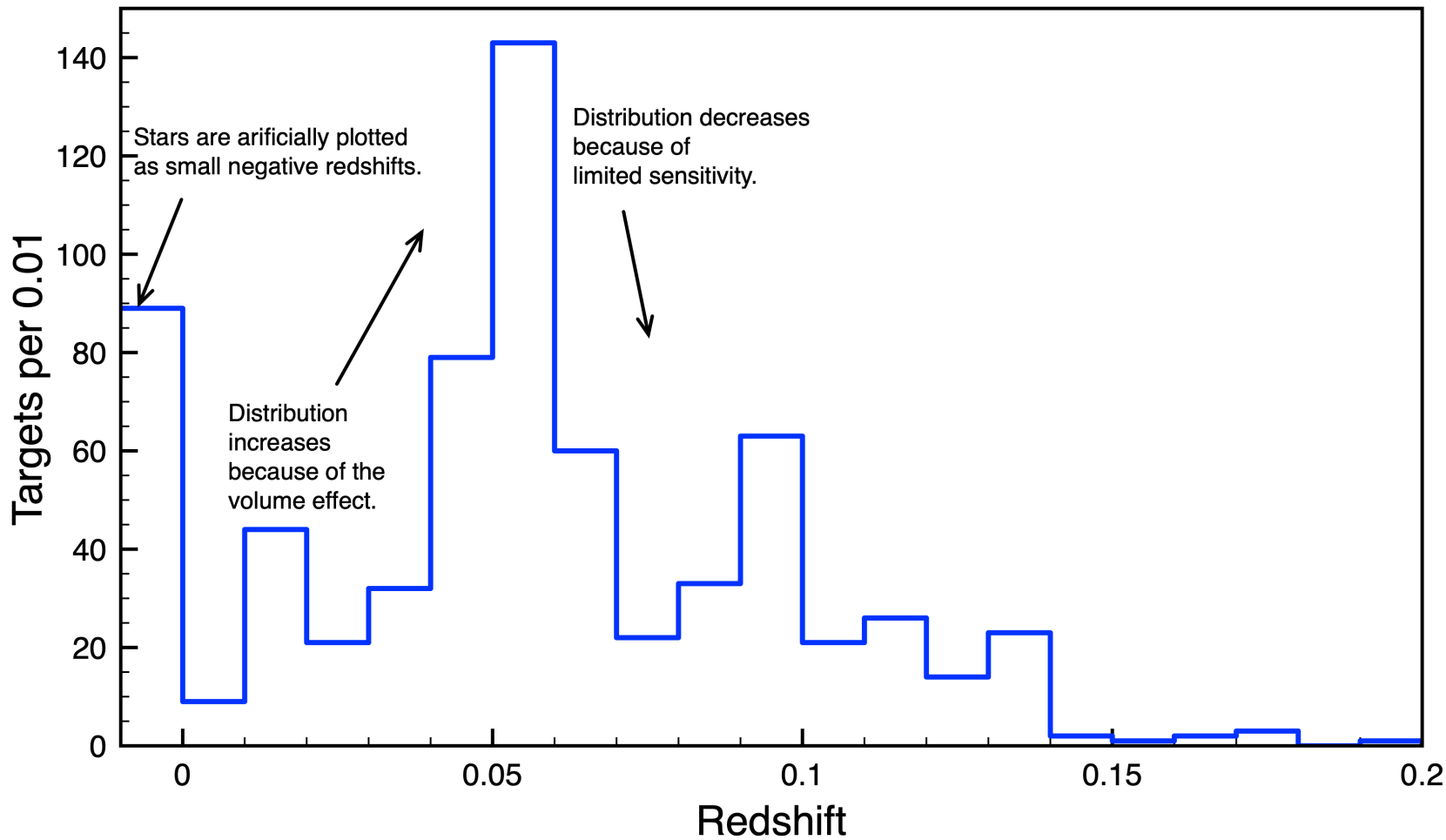
Targetting Efficiency=
Spectra Requested / Potential Targets

Redshift Efficiency =
Redshift determined / Potential Targets

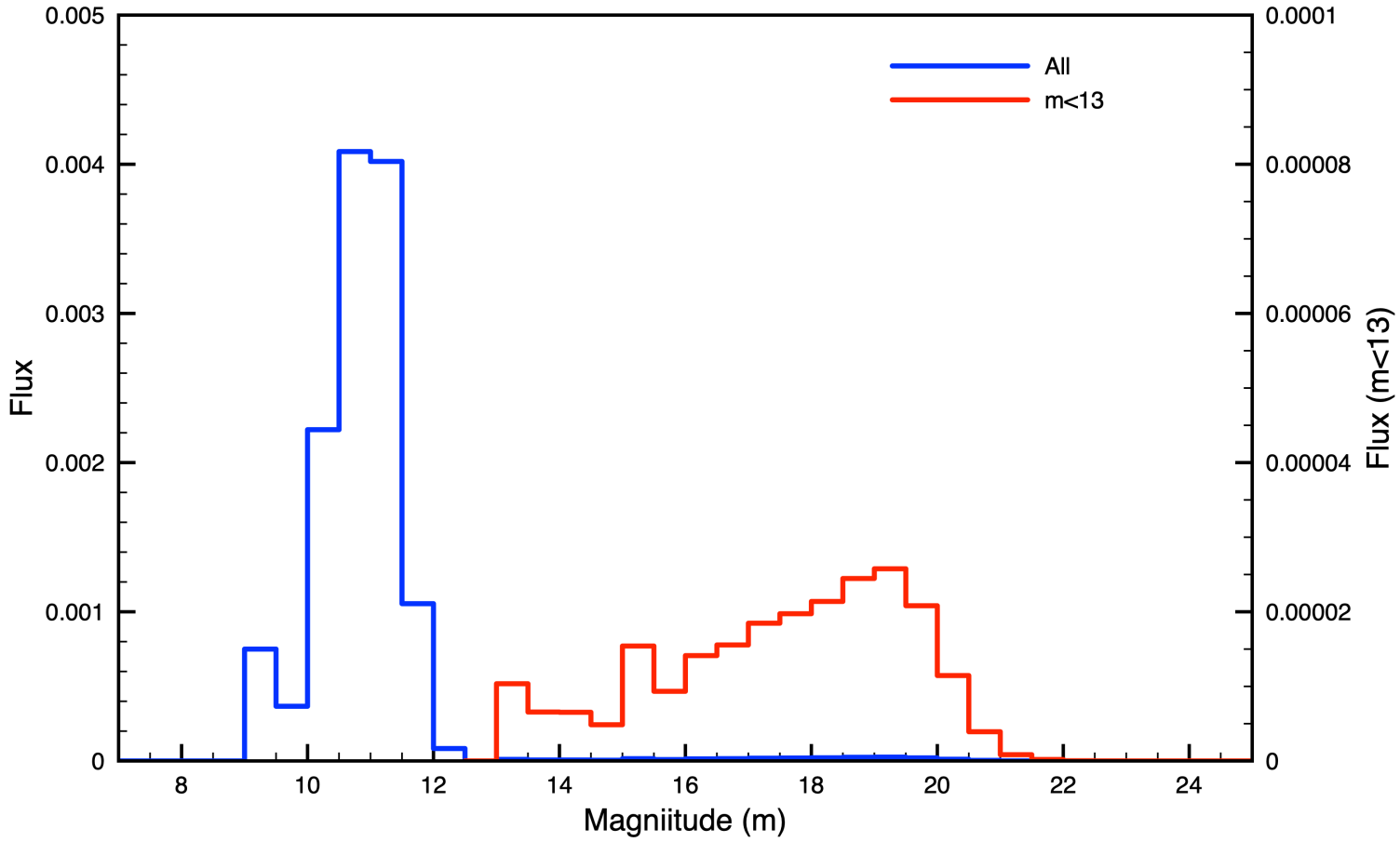
The difference between spectra requested and spectra obtained is a) a fiber was no assigned as indicated in the hydra file and b) aperture 21 is broken.



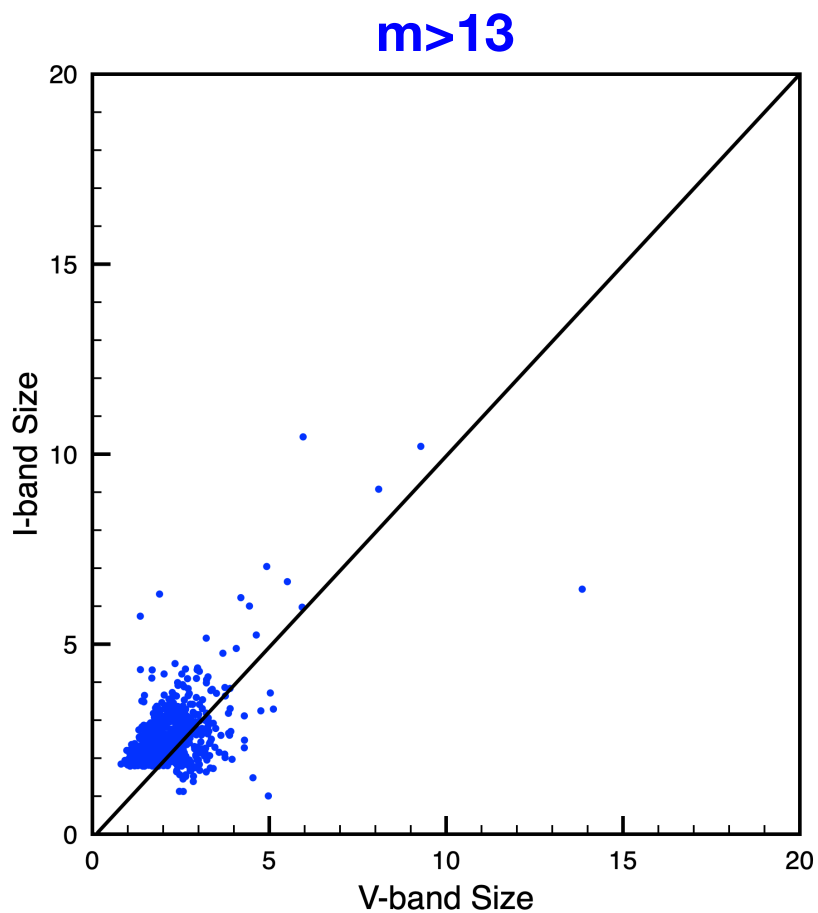
Redshift Distribution

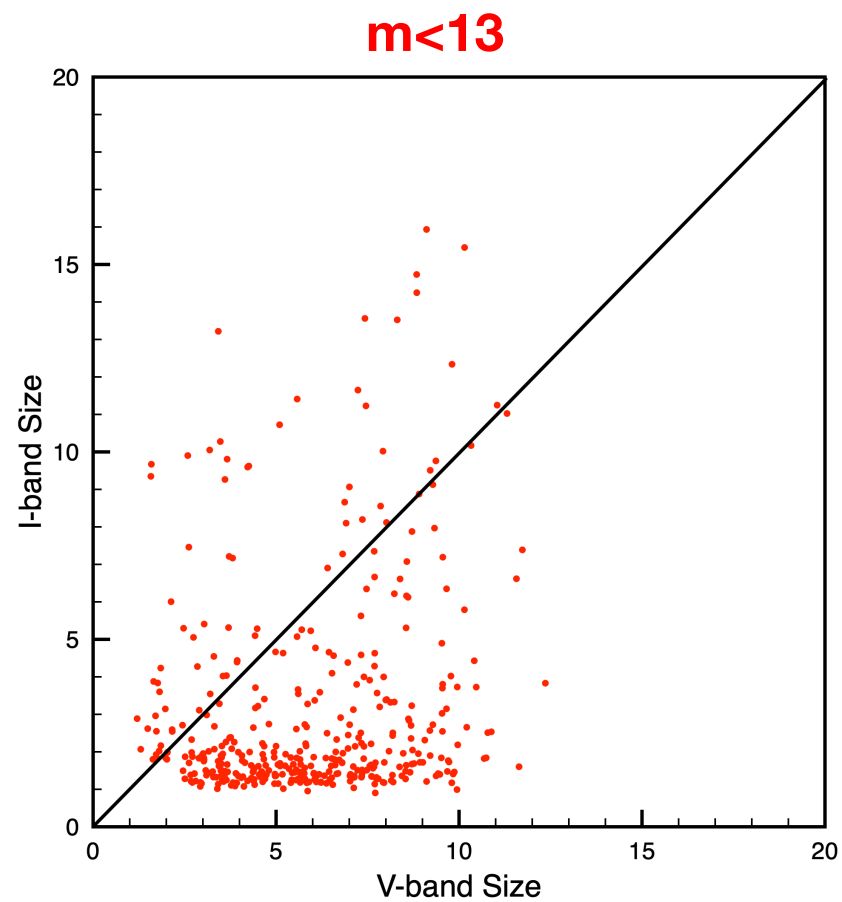


How much luminosity is there in faint objects?



Object Sizes





How are doing?

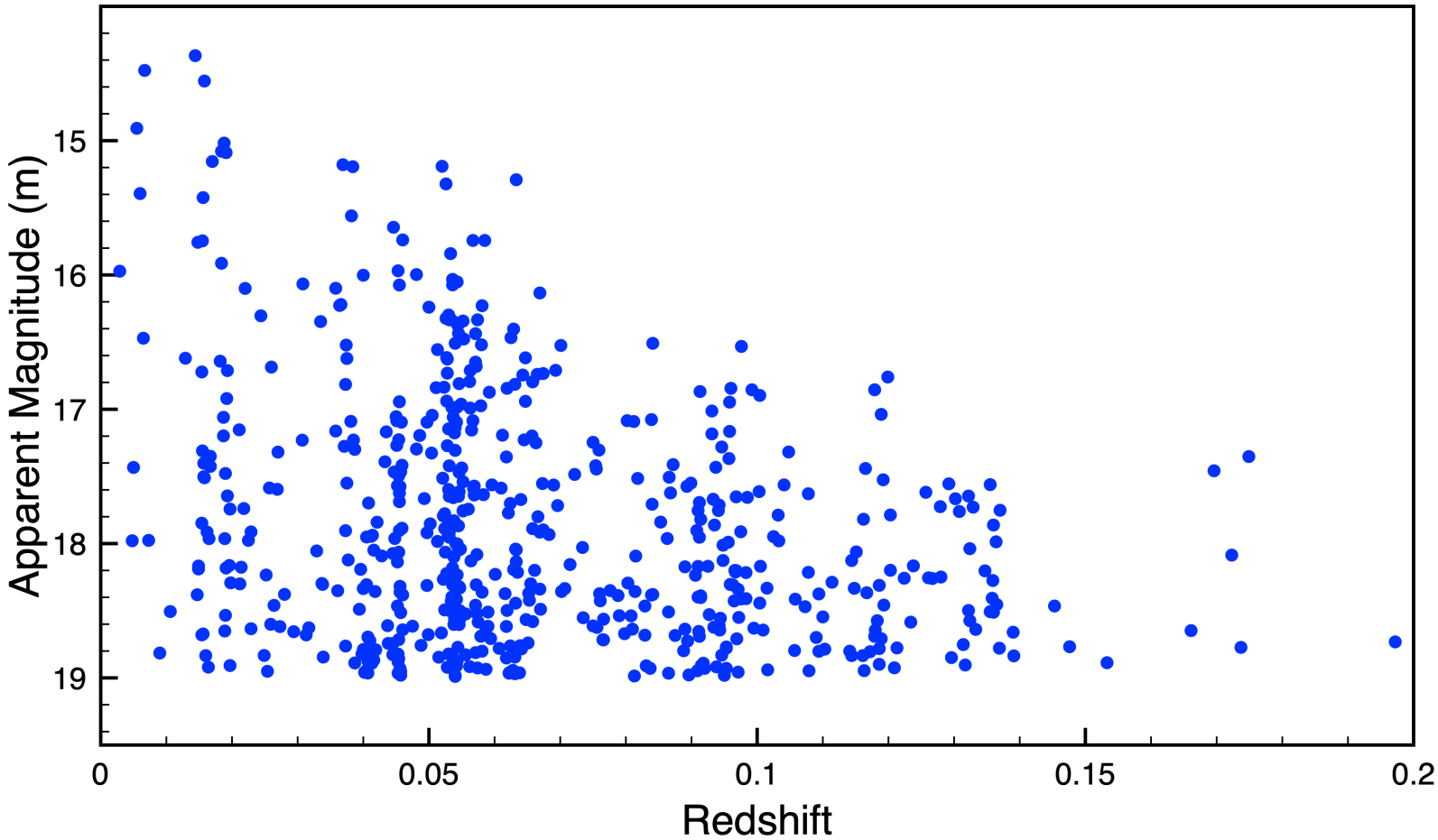
- We have redshifts for most of the brighter galaxies
  - How many of the dimmer objects are galaxies with $z<0.07$?
  - How many of the brighter targets are stars?
- How important is the identification of fainter objects?
  - There are many fainter objects, not fully resolved by our angular resolution.
  - How much 21 cm flux is in the fainter objects?
- Can we use the fact that galaxies with low angular separation tend to have similar redshifts?
- Can we restrict the analysis to some lower $z<0.07$, where we are more complete?

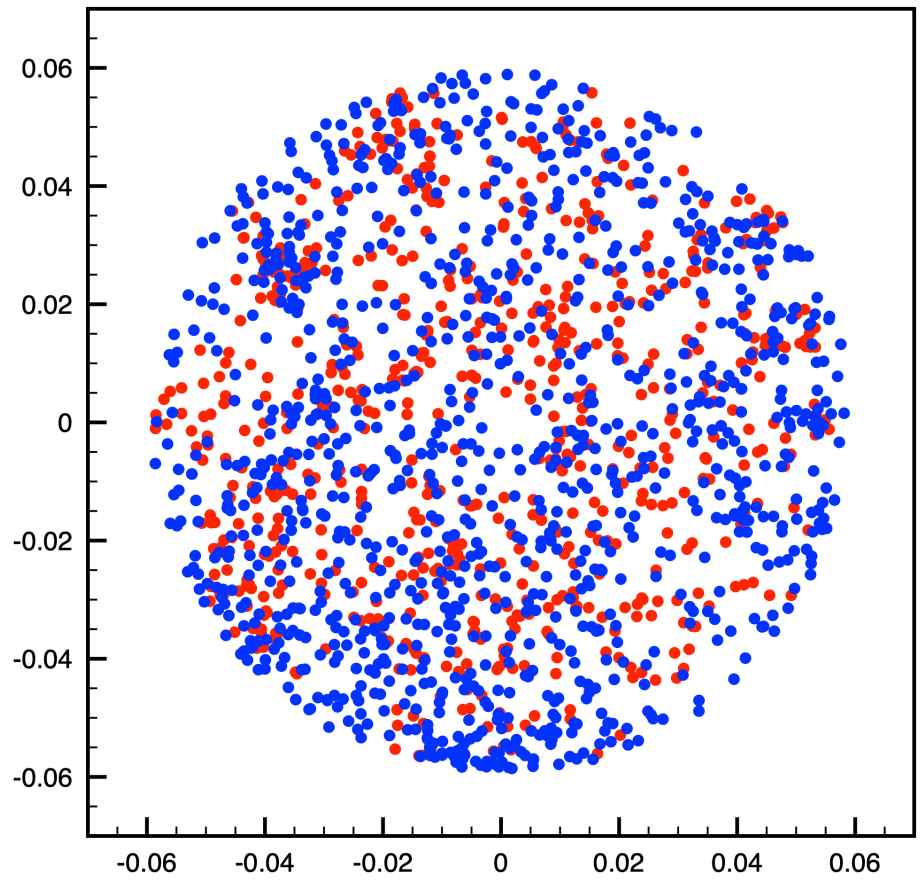
Conclusion: Not clear to me

Some results for bright targets

13.05	1	-2	-1.0000		
13.16	1	5	0.0000		
13.28	1	5	0.0000		
13.54	0				
13.58	2	-5	-1.0000	5	0.0000
13.73	0				
13.81	0				
13.86	1	5	0.0000		
13.87	0				
14.01	1	5	0.0000		
14.04	1	-5	-1.0000		
14.37	1	5	0.0140		
14.40	1	5	0.0000		
14.48	1	3	0.0070		
14.56	1	5	0.0160		
14.58	0				
14.83	0				
14.84	0				
14.90	1	5	0.0000		
14.91	1	5	0.0050		

Magnitude vs Redshift Plot



Map of Targets

Red=Redshift Determined
Blue=Redshift not Determined