SALT RSS-NIR MID-TERM REVIEW MAY 20 & 21, 2009

FABRY-PEROT ORDER BLOCKING FILTER SELECTION

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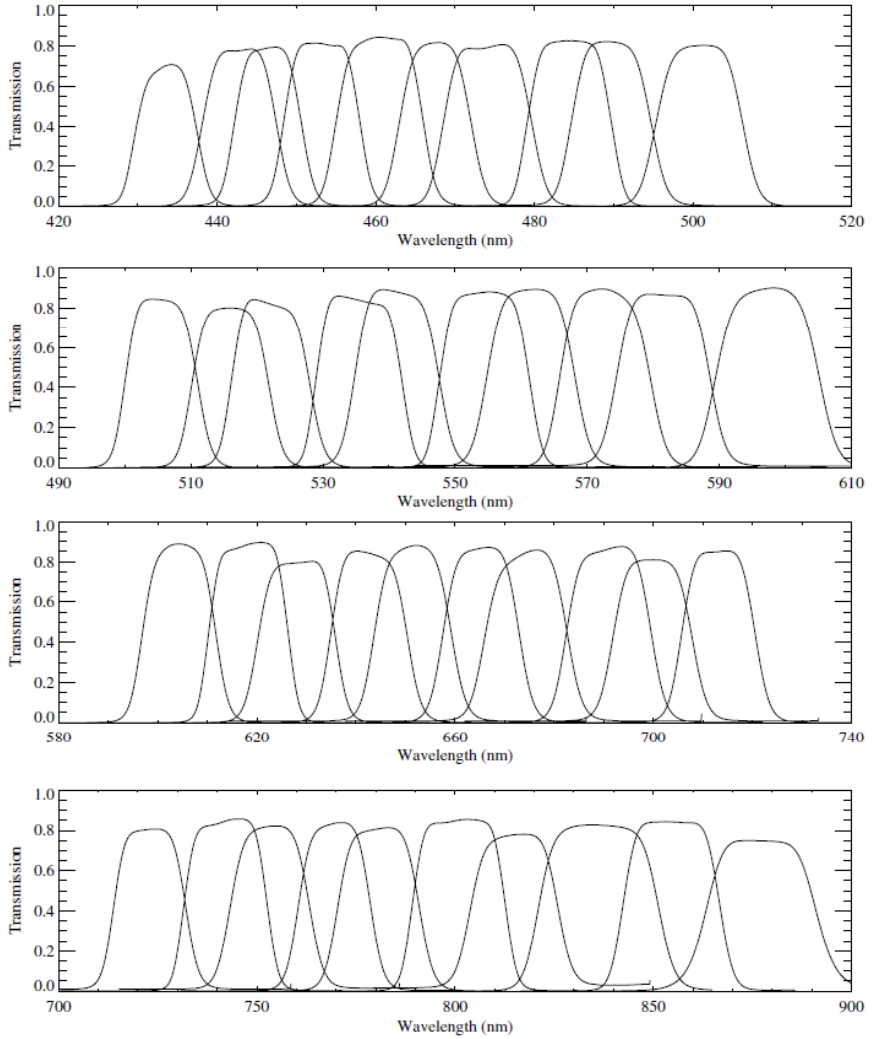
SPECTRAL COVERAGE

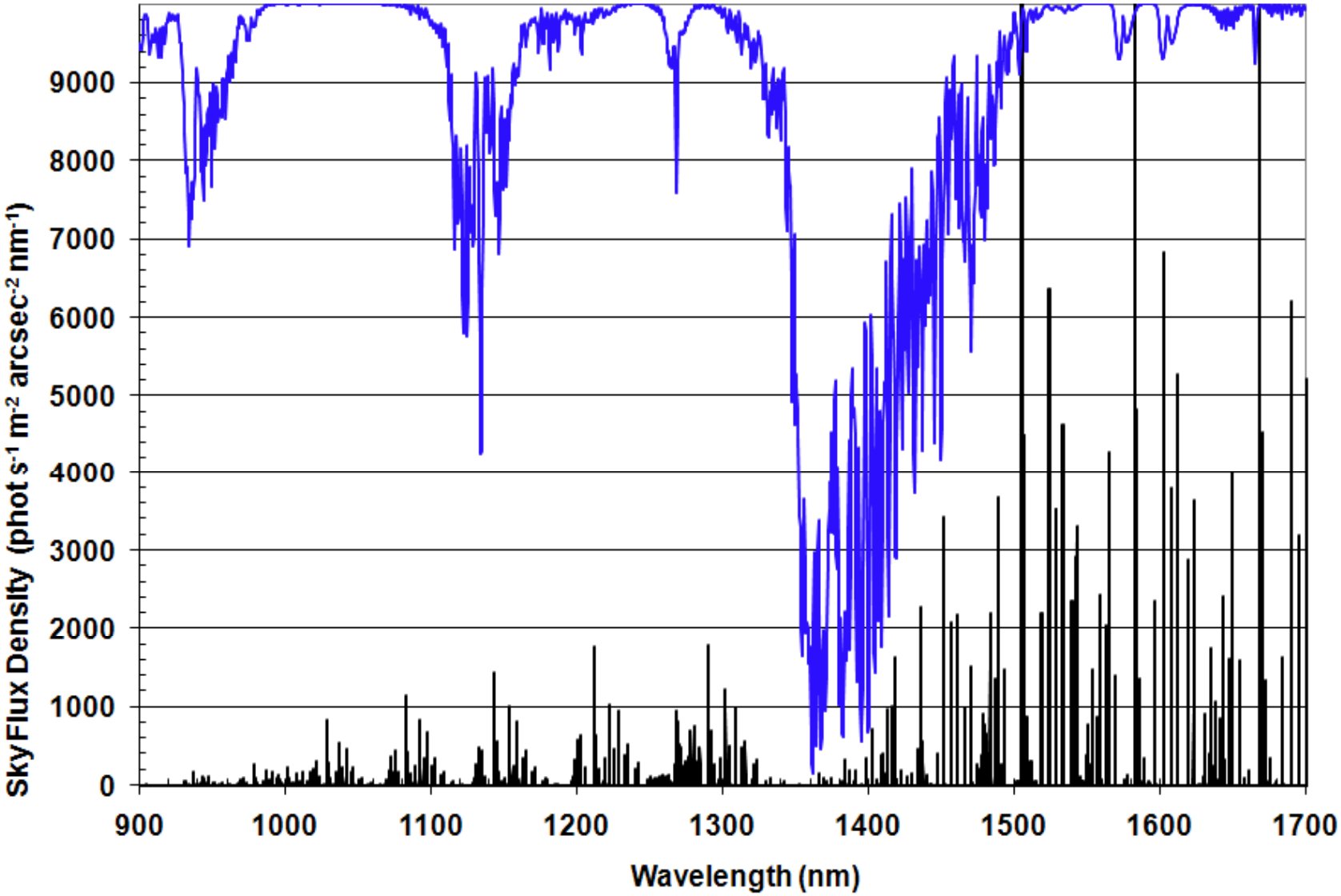
- Unlike the VIS arm, we will not need complete spectral coverage in the NIR arm
- Only discrete atmospheric windows are OH emission line free in the NIR

RSS-VIS filter complement



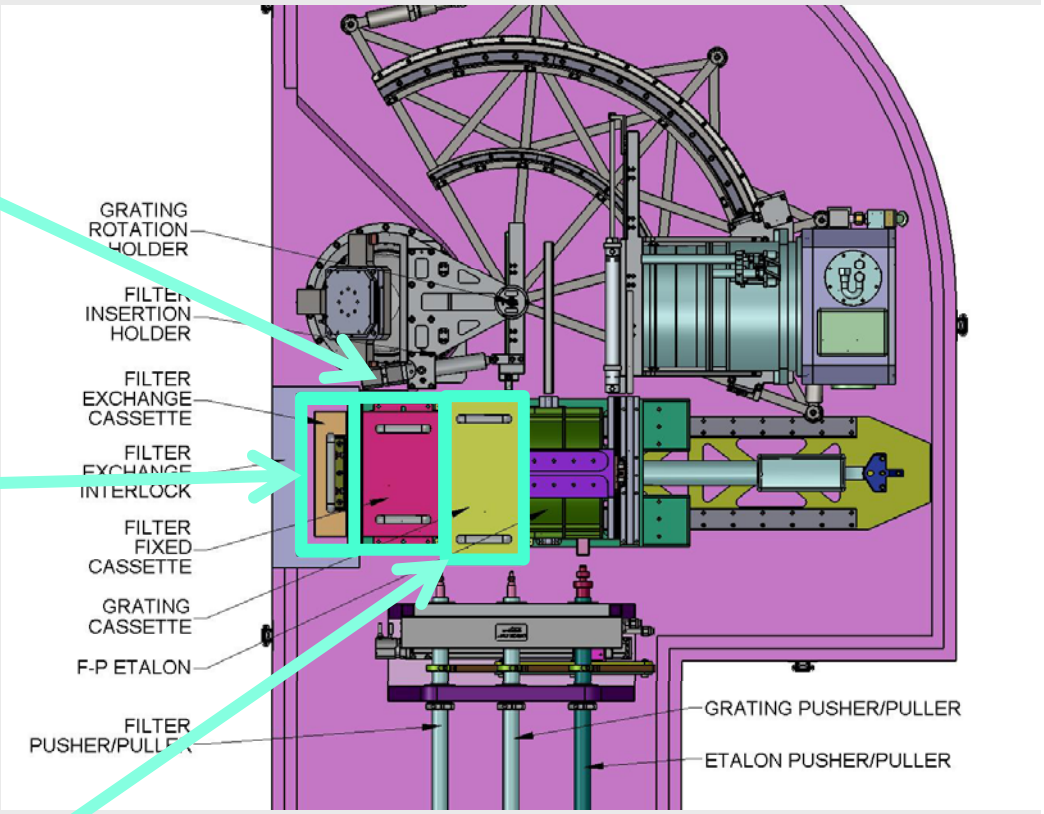
Rangwala, et al., 2008, AJ, 135, 1825

NIR NIGHT SKY



NUMBER OF FILTERS

- We have 12 filter slots available inside the pre-dewar
- 3 filters at a time can be exchanged during the day without warming up the pre-dewar
- Space is limited
  - The space that houses FP filters competes with the same space that houses the gratings



Filters tilted at 2º in their holders to put ghost reflections out of FOV

SPECTRAL LINES OF INTEREST

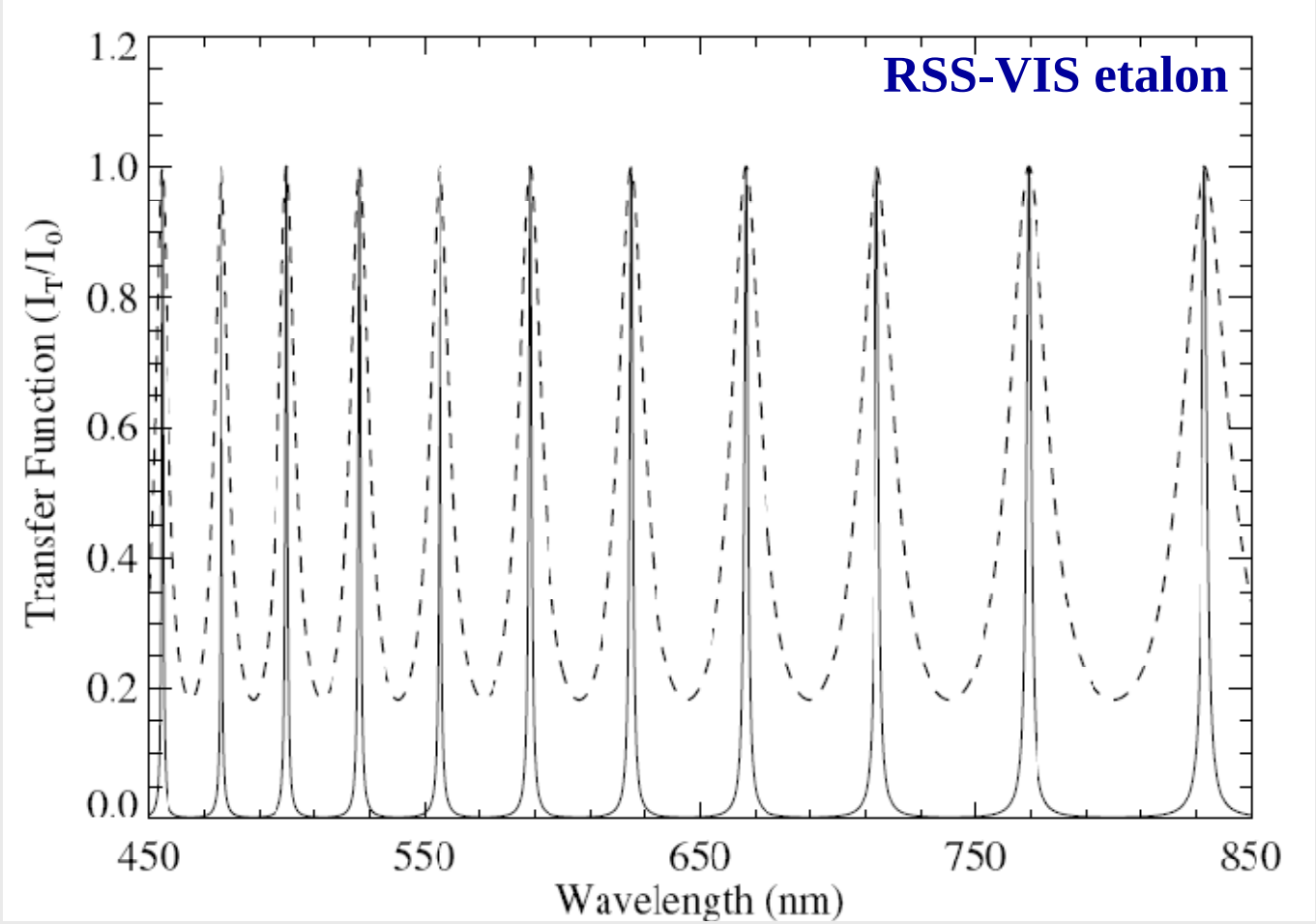
Wavelength (μm)	Element	Location		Wavelength (μm)	Element	Location
0.9069	[S III]	SF		1.26	[Fe II]	ISM, SN
0.91882	H-a, z=0.4	z search		1.28	Pa-b	ISM, SF
0.93175	[O II], z=1.5	z search		1.3126	H-a, z=1	z search
0.9532	[S III]	SF		1.3376	Ly-a, z=10	z search
0.9722	H-b, z=1	z search		1.43	[Si X]	nebula, AGN
0.9728	Ly-a, z=7	z search		1.4583	H-b, z=2	z search
0.9827	[C I]	nebula		1.4908	[O II], z=3	z search
0.9853	[C I]	nebula		1.5	Mg I	nebula
0.99	[S VIII]	AGN		1.5021	[O III], z=2	z search
1.0014	[O III], z=1	z search		1.5808	Ly-a, z=12	z search
1.0287	[S II]	SF		1.588	Br 14-4	H II regions
1.0321	[S II]	ISM, SF		1.611	Br 13-4	H II regions
1.0395	[N I]	SF		1.63	CO(6,3)	supergiants
1.0401	[N I]	SF		1.64075	H-a, z=1.5	z search
1.07	[Fe XIII]	AGN		1.641	Br 12-4	H II regions
1.08	He I	ISM, nebula		1.644	[Fe II]	ISM, SN
1.1181	[O II], z=2	z search		1.65231	[O III], z=2.3	z search
1.12	O I	nebula		1.65274	H-b, z=2.4	z search
1.25	[S IX]	AGN		1.68	Br 11	H II regions

FP ETALON FREE SPECTRAL RANGE

Changes with wavelength:

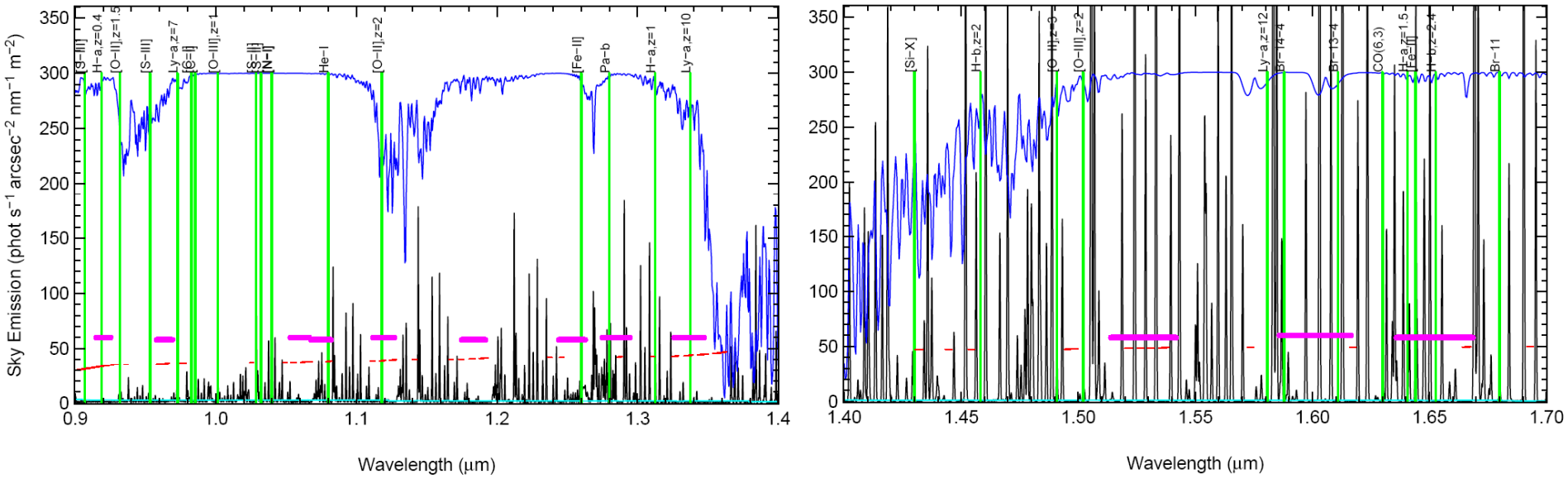
10 nm at λ = 0.9 μm

35 nm at λ = 1.7 μm



PRELIMINARY FP FILTER LOCATIONS

- z=0 emission lines in ISM, Galactic star-forming regions
  - Cover specific lines
- Blind redshift search for emission line objects
  - Cover atmospheric windows clear of sky emission lines



blue line: atmospheric transmission
cyan line: 2x sky continuum between lines
red dashes: windows 5 FP linewidths wide that are free of emission lines above cyan line
thick magenta lines: preliminary filter locations

FILTER WAVELENGTHS

Filter #	λ_{start}	λ_{end}	Ly-α redshifts
1	0.915	0.925	6.5-6.6
2	0.958	0.969	6.9-7.0
3	1.053	1.066	7.6-7.8
4	1.068	1.082	7.8-7.9
5	1.112	1.127	8.1-8.3
6	1.175	1.192	8.7-8.8
7	1.244	1.263	9.2-9.4
8	1.275	1.295	9.5-9.6
9	1.326	1.347	9.9-10.1
10	1.514	1.542	11.4-11.7
11	1.586	1.617	12.0-12.3
12	1.636	1.669	12.4-12.7

FURTHER ANALYSES

- Better determine level above sky continuum where window can be called “line-free”
- Convolve etalon transmission lineshape with night sky spectrum
- Investigate effects of sky emission lines in etalon lineshape wings
  - May have implications on blocking filter specifications and width, as well as FP filter spectral locations
- Optimize filter locations for greatest number of planned science programs
- Run tests with RSS-VIS later this year during commissioning
  - Observations in the red with one etalon and blocking filter