

JWST_z65qso

June 22, 2017

```
In [1]: %pylab inline
import os
from astropy.cosmology import Planck13
import astropy.units as u
from simqso.sqgrids import *
from simqso import sqbase
from simqso import sqmodels
from simqso.sqrun import buildSpectraBulk
from simqso.hiforest import generate_binned_forest, MeanIGMTransmissionGrid
from simqso.dustextinction import SMCdust_fn
cosmo = Planck13
m1450 = 19.5
z_qso = 6.5
E_BmV = 0.1
SFR = 100
```

Populating the interactive namespace from numpy and matplotlib

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In [2]: wave = sqbase.fixed_R_dispersion(0.9e4, 30e4, 500)
m = AppMagVar(FixedSampler([m1450]), 'UKIDSS-Y')
z = RedshiftVar(FixedSampler([z_qso]))
qsos = QsoSimPoints([m, z], cosmo=Planck13, units='flux')

In [3]: m2M = lambda z: sqbase.mag2lum(1.1e4, 1450, z, cosmo)
qsos.addVar(AbsMagVar(FixedSampler(qsos.appMag-m2M(qsos.z))))

In [4]: if not os.path.exists('z65testforest.fits'):
    generate_binned_forest('z65testforest', sqmodels.McG13hiz_model, 500,
        array([z_qso]), (0.9e4, 1.2e4),
        500, outputDir='.')

In [5]: forest = MeanIGMTransmissionGrid('z65testforest', wave)
igmAbs = HIAbsorptionVar(forest)

In [6]: contVar = BrokenPowerLawContinuumVar([FixedSampler([-1.5]),
        FixedSampler([-0.5])],
        [1215.]])
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emLineVar = generateBEffEmissionLines(qsos.absMag,NoScatter=True)
fescales = [(0,1540,0.5),(1540,1680,2.0),(1680,1868,1.6),
            (1868,2140,1.0),(2140,3500,1.0)]
feVar = FeTemplateVar(VW01FeTemplateGrid(qsos.z,wave,scales=fescales))
qsos.addVars([contVar,emLineVar,feVar,igmAbs])
qsos.loadPhotoMap(['UKIRT','UKIDSS_LAS'],)
_,spectra = buildSpectraBulk(wave,qsos,maxIter=3,saveSpectra=True)

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using Fe scales: [(0, 1540, 0.5), (1540, 1680, 2.0), (1680, 1868, 1.6), (1868, 2140, 1.0)]
simulating 1 quasar spectra
units are flux
buildSpectra iteration 1 out of 3
--> delta mag mean = -0.1080293, rms = 0.0000000, |max| = 0.1080293
buildSpectra iteration 2 out of 3
--> delta mag mean = -0.0042740, rms = 0.0000000, |max| = 0.0042740

```

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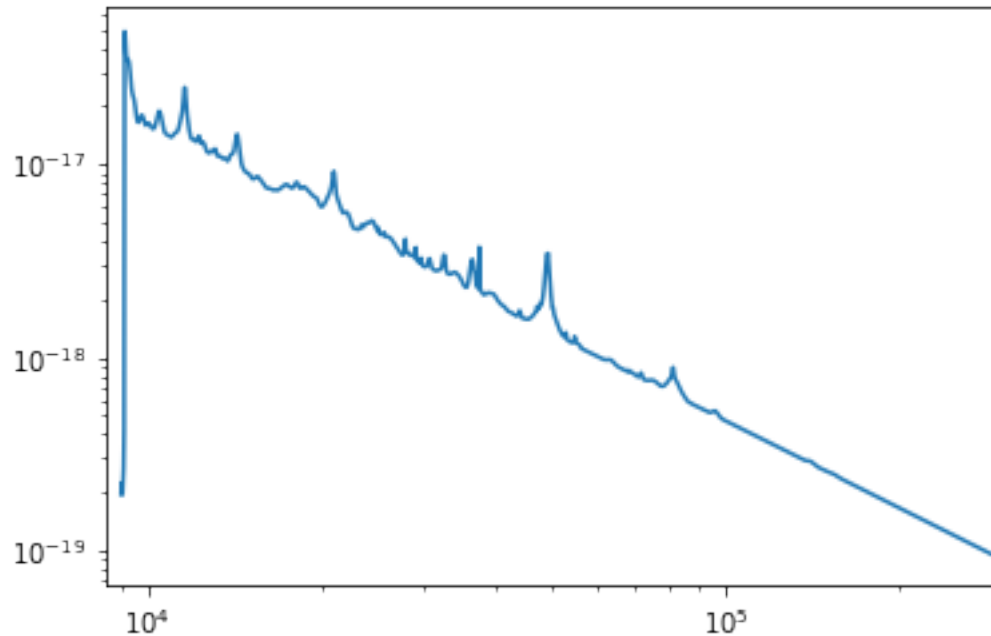
In [7]: plot(wave,spectra[0])
        yscale('log')
        xscale('log')
        xlim(0.85e4,3e5)

```

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Out[7]: (8500.0, 300000.0)

```

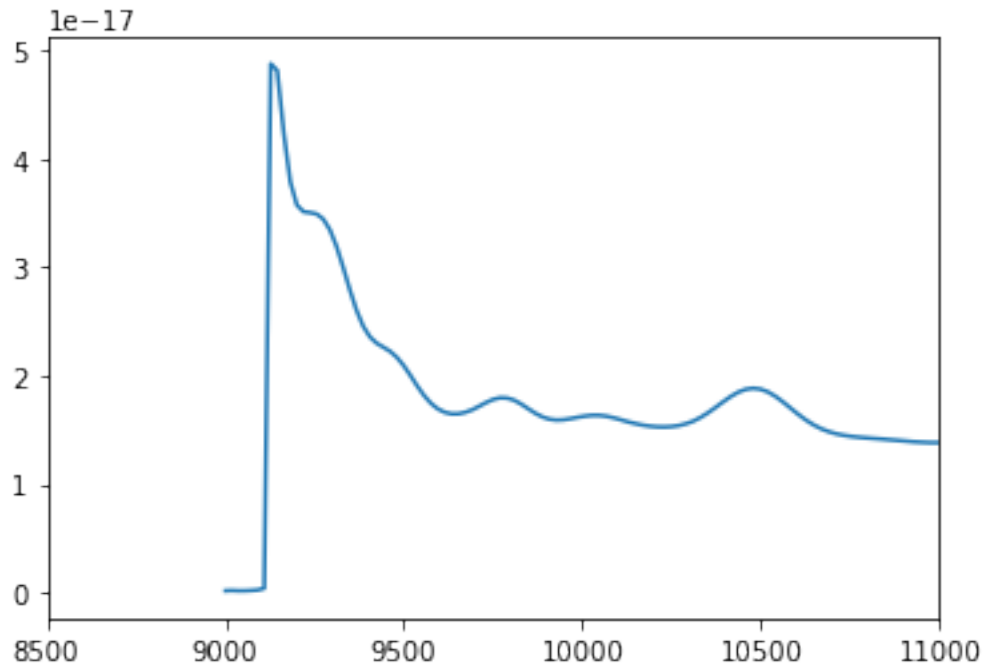


```

In [8]: plot(wave,spectra[0])
        xlim(0.85e4,1.1e4)

```

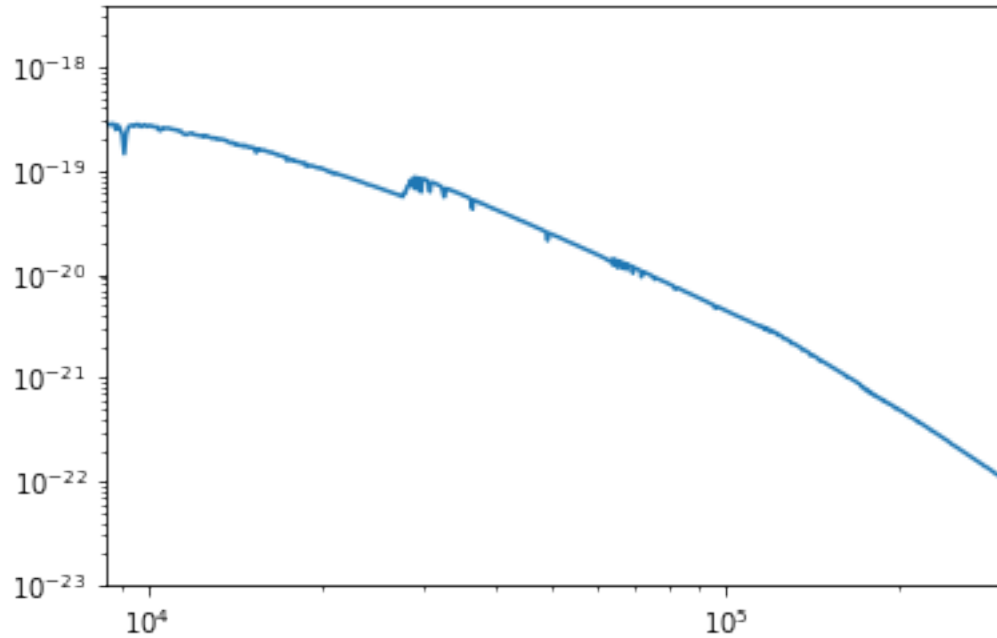
Out [8]: (8500.0, 11000.0)



```
In [9]: s99 = Table.read('fig8e.dat', format='ascii',
                        guess=False, header_start=2, data_start=3)
L_lam = 10**(s99['200Myr']+log10(SFR)) # stored model is 1 Msun/yr
D_L = cosmo.luminosity_distance(z_qso).to(u.cm)
rf_wave = s99['WAVELENGTH']
host_wave = (1+z_qso)*rf_wave
host_flam = L_lam/(4*pi*D_L**2)/(1+z_qso)
host_flam = SMCdust_fn(rf_wave, host_flam, E_BmV)
```

```
In [10]: plot(host_wave, host_flam)
         yscale('log')
         xscale('log')
         xlim(0.85e4, 3e5)
         ylim(1e-23, 4e-18)
```

Out [10]: (1e-23, 4e-18)



```
In [11]: host_flam = sqbase.resample(host_wave,host_flam,wave)
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```
In [12]: z65qso_spec = Table()
z65qso_spec['wave'] = wave
z65qso_spec['qso'] = spectra[0]
z65qso_spec['host'] = host_flam
z65qso_spec['total'] = spectra[0]+host_flam
```

```
In [13]: z65qso_spec
```

```
Out[13]: <Table length=1755>
```

wave float64	qso float64	host float64	total float64

9000.0	1.97018867396e-19	2.3778403171e-19	4.34802899106e-19
9018.01801201	2.23322318424e-19	2.31320764053e-19	4.54643082477e-19
9036.0720961	1.94672682829e-19	2.24844556925e-19	4.19517239754e-19
9054.16232449	1.97816193499e-19	2.06556300538e-19	4.04372494038e-19
9072.28876954	2.24734708845e-19	1.87218265822e-19	4.11952974667e-19
9090.45150376	2.67495711608e-19	1.67841516335e-19	4.35337227943e-19
9108.65059979	4.24530846569e-19	1.4842597457e-19	5.72956821139e-19
9126.88613045	4.87251722447e-17	1.59782089054e-19	4.88849543337e-17
9145.15816865	4.81048356519e-17	1.7942163707e-19	4.82842572889e-17
9163.46678751	4.23354823942e-17	1.99100503487e-19	4.25345828977e-17
...
295073.529356	9.28667305313e-20	1.17973602367e-22	9.29847041337e-20

```

295664.266956 9.25885478224e-20 1.1706777986e-22 9.27056156023e-20
296256.187213 9.23111984111e-20 1.16160532917e-22 9.2427358944e-20
296849.292495 9.20346798011e-20 1.15288371417e-22 9.21499681725e-20
297443.585174 9.17589895039e-20 1.14414463849e-22 9.18734039678e-20
298039.067629 9.14841250383e-20 1.13520069908e-22 9.15976451082e-20
298635.74224 9.12100839304e-20 1.12603984407e-22 9.13226879148e-20
299233.611394 9.09368637138e-20 1.11686064902e-22 9.10485497787e-20
299832.677483 9.06644619296e-20 1.10686573762e-22 9.07751485034e-20
300432.942903 9.03928761262e-20 1.09682834523e-22 9.05025589608e-20

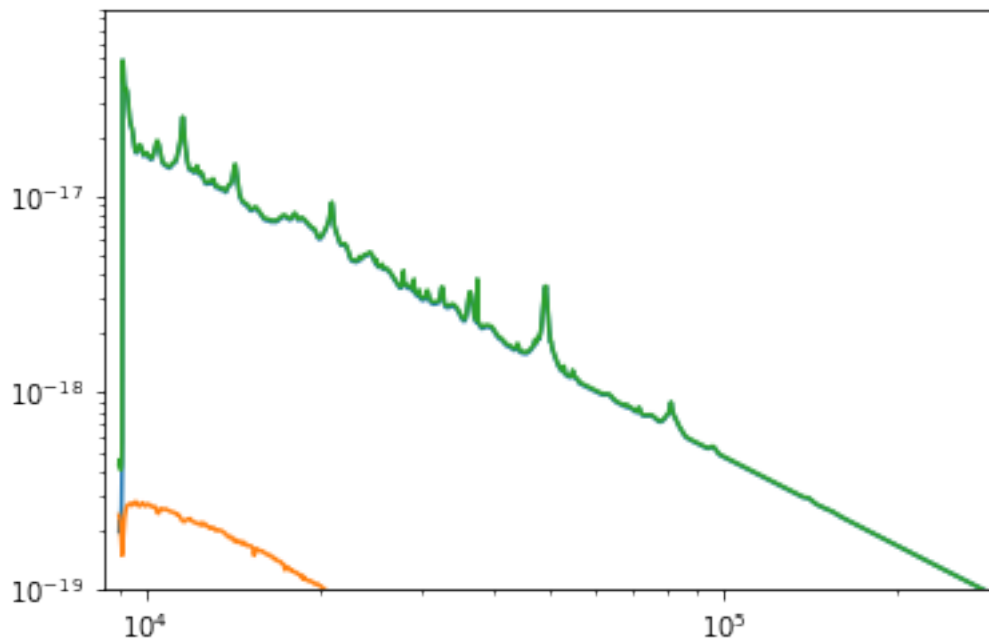
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```

In [14]: for k in ['qso', 'host', 'total']:
          plot(z65qso_spec['wave'], z65qso_spec[k])
          yscale('log')
          xscale('log')
          xlim(0.85e4, 3e5)
          ylim(1e-19, 9e-17)

```

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Out[14]: (1e-19, 9e-17)
```



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In [15]: z65qso_spec.write('jwst_z65qso_spec.txt', format='ascii', overwrite=True)
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In [ ]:
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