

```
In [5]: !pip install astropy
```

```
Requirement already satisfied: astropy in /usr/local/lib/python3.6/dist-packages (3.0.5)  
Requirement already satisfied: numpy>=1.10.0 in /usr/local/lib/python3.6/dist-packages (from astropy) (1.17.3)
```

```
In [2]: !pip install synphot
```

```
Collecting synphot  
  Downloading https://files.pythonhosted.org/packages/37/1c/5f1a593827ca7cfc669fbb4d5959e7bef1d9879c2b8ca6ccdd4c93ff9565/synphot-0.1.3.tar.gz (1.5MB)  
    |████████████████████████████████████████████████████████████████████████████████| 1.5MB 4.6MB/s  
Requirement already satisfied: numpy in /usr/local/lib/python3.6/dist-packages (from synphot) (1.17.3)  
Requirement already satisfied: astropy in /usr/local/lib/python3.6/dist-packages (from synphot) (3.0.5)  
Building wheels for collected packages: synphot  
  Building wheel for synphot (setup.py) ... done  
  Created wheel for synphot: filename=synphot-0.1.3-cp36-cp36m-linux_x86_64.whl size=927369 sha256=bdbale828daeb5659529116b830a098eb5b620d0cea3b539041efa2f19517931  
  Stored in directory: /root/.cache/pip/wheels/4d/1e/69/9a649e40a0fd41a7dd5b4fe96d4a652ed8c7f418b06f7f150b  
Successfully built synphot  
Installing collected packages: synphot  
Successfully installed synphot-0.1.3
```

```
In [0]: from synphot.utils import download_data
```

```
In [29]: file_list = download_data('cdbs/')
```

```
cdbs/calspec/alpha_lyr_stis_008.fits already exists, skipping download
cdbs/extinction/lmc_30dorshell_001.fits already exists, skipping download
cdbs/extinction/lmc_diffuse_001.fits already exists, skipping download
cdbs/extinction/milkyway_diffuse_001.fits already exists, skipping download
cdbs/extinction/milkyway_dense_001.fits already exists, skipping download
cdbs/extinction/milkyway_rv21_001.fits already exists, skipping download
cdbs/extinction/milkyway_rv4_001.fits already exists, skipping download
cdbs/extinction/smc_bar_001.fits already exists, skipping download
cdbs/extinction/xgal_starburst_001.fits already exists, skipping download
cdbs/comp/nonhst/bessell_h_004_syn.fits already exists, skipping download
cdbs/comp/nonhst/bessell_j_003_syn.fits already exists, skipping download
cdbs/comp/nonhst/bessell_k_003_syn.fits already exists, skipping download
cdbs/comp/nonhst/cousins_i_004_syn.fits already exists, skipping download
cdbs/comp/nonhst/cousins_r_004_syn.fits already exists, skipping download
cdbs/comp/nonhst/johnson_b_004_syn.fits already exists, skipping download
cdbs/comp/nonhst/johnson_i_003_syn.fits already exists, skipping download
cdbs/comp/nonhst/johnson_j_003_syn.fits already exists, skipping download
cdbs/comp/nonhst/johnson_k_003_syn.fits already exists, skipping download
cdbs/comp/nonhst/johnson_r_003_syn.fits already exists, skipping download
cdbs/comp/nonhst/johnson_u_004_syn.fits already exists, skipping download
cdbs/comp/nonhst/johnson_v_004_syn.fits already exists, skipping download
```

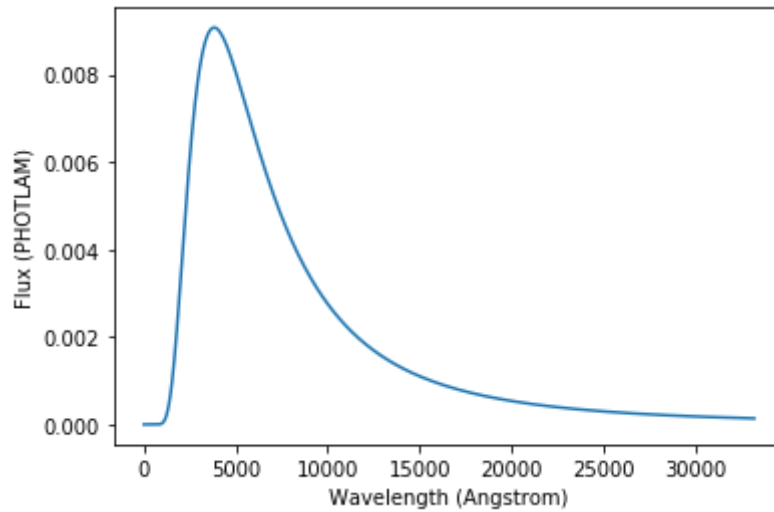
```
In [0]: from astropy import units as u
from astropy import constants as c
from synphot import units, SourceSpectrum
from synphot.models import (BlackBodyNorm1D, GaussianAbsorption1D, GaussianFlux1D, PowerLawFlux1D)
from synphot.spectrum import BaseUnitlessSpectrum
```

```
In [0]: import synphot as S
```

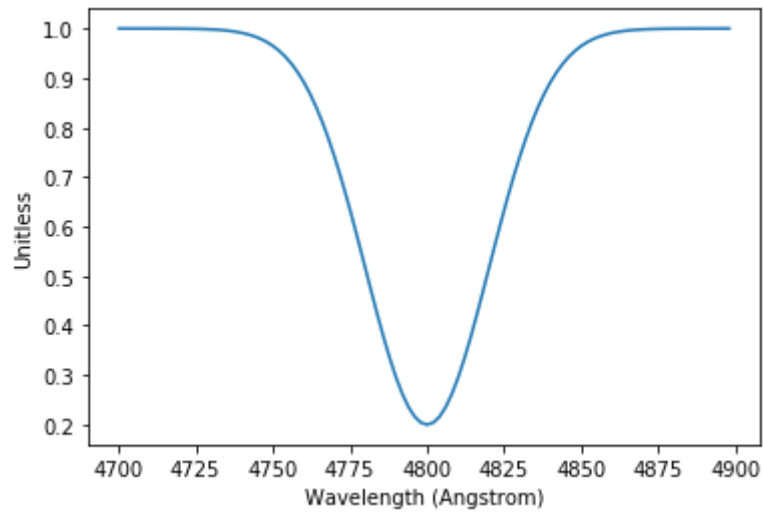
```
In [0]: bb = SourceSpectrum(BlackBodyNorm1D, temperature=9600)
```

```
In [0]: g_abs = S.BaseUnitlessSpectrum(GaussianAbsorption1D, amplitude=0.8, mean=4800, stddev=20)
```

```
In [54]: bb.plot()
```

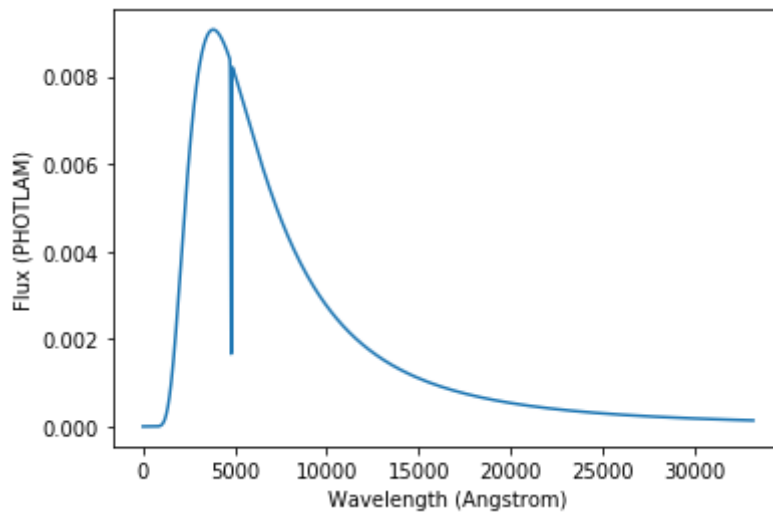


```
In [55]: g_abs.plot()
```



```
In [0]: sp = g_abs*bb
```

```
In [57]: sp.plot()
```



```
In [13]: bb(3.*u.mm, flux_units=units.FLAM)
```

```
Out[13]: 1.4783042 × 10-13 photlam
```

```
In [0]: L = 4 * 3.14159 * (2.*7e8*u.m)**2 * c.sigma_sb* (9000. * u.Kelvin)**4
```

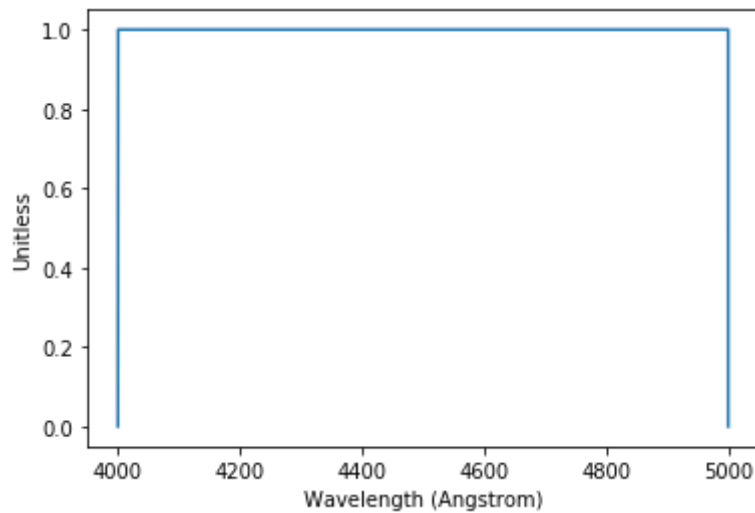
```
In [96]: print(L)
```

```
9.163191748918393e+27 W
```

```
In [97]: print(bb)
```

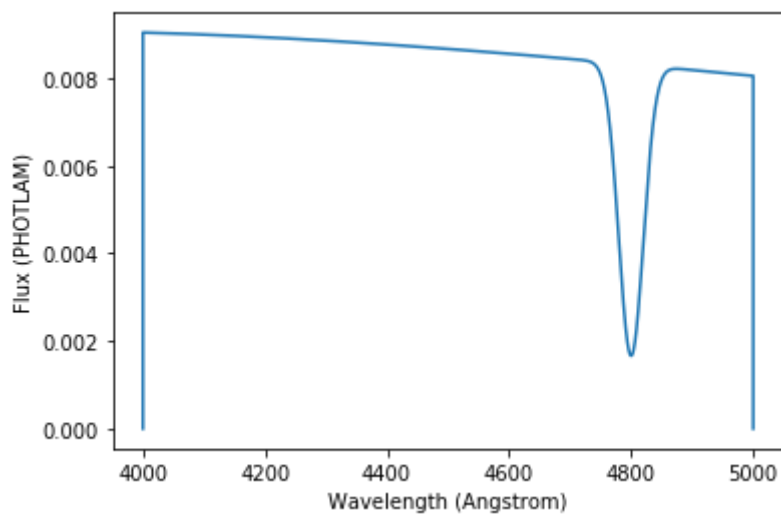
```
SourceSpectrum at z=0.0
Model: BlackBodyNorm1D
Inputs: ('x',)
Outputs: ('y',)
Model set size: 1
Parameters:
  temperature
  -----
           9600.0
```

```
In [98]: bp_tophat = S.SpectralElement(S.Box1D, amplitude=1, x_0=4500, width=1000
)
bp_tophat.plot()
```



```
In [0]: obs = S.Observation(sp, bp_tophat)
```

```
In [100]: obs.plot()
```



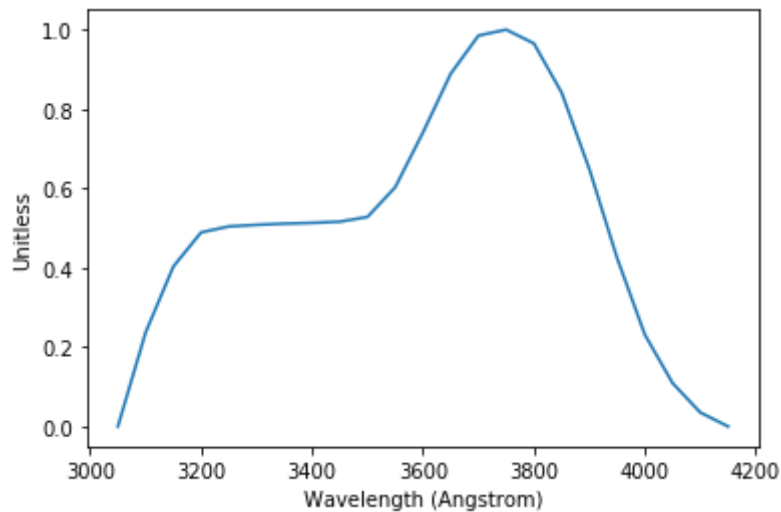
```
In [0]: telescope_area = 3*3*3.14159
```

```
In [104]: obs.countrate(area=telescope_area)
```

```
Out[104]: 234.40878  $\frac{ct}{s}$ 
```

```
In [0]: bp_U = S.SpectralElement.from_file('cdbs/comp/nonhst/johnson_u_004_syn.fits')
```

```
In [106]: bp_U.plot()
```



```
In [1]: bp_U.waverange.value
```

```
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-----
NameError                                Traceback (most recent call 1
ast)
<ipython-input-1-bc7b073bba5d> in <module>
----> 1 bp_U.waverange.value

NameError: name 'bp_U' is not defined
```

```
In [51]: sp = SourceSpectrum.from_vega()
sp.plot()
```

Downloading [http://ssb.stsci.edu/cdbs/calspec/alpha\\_lyr\\_stis\\_008.fits](http://ssb.stsci.edu/cdbs/calspec/alpha_lyr_stis_008.fits)  
[Done]

