Chapter 8: Astropy and Associated Packages

Section 2: Units and Constants

In [5]:
```
import numpy as np
import astropy.constants as ac
import astropy.units as u
import matplotlib.pyplot as plt

L = 3 * u.Lsun
d = 1.3 * u.kpc
F = L / (4 * np.pi * d**2)
F.to(u.erg/u.s/u.cm**2)
```

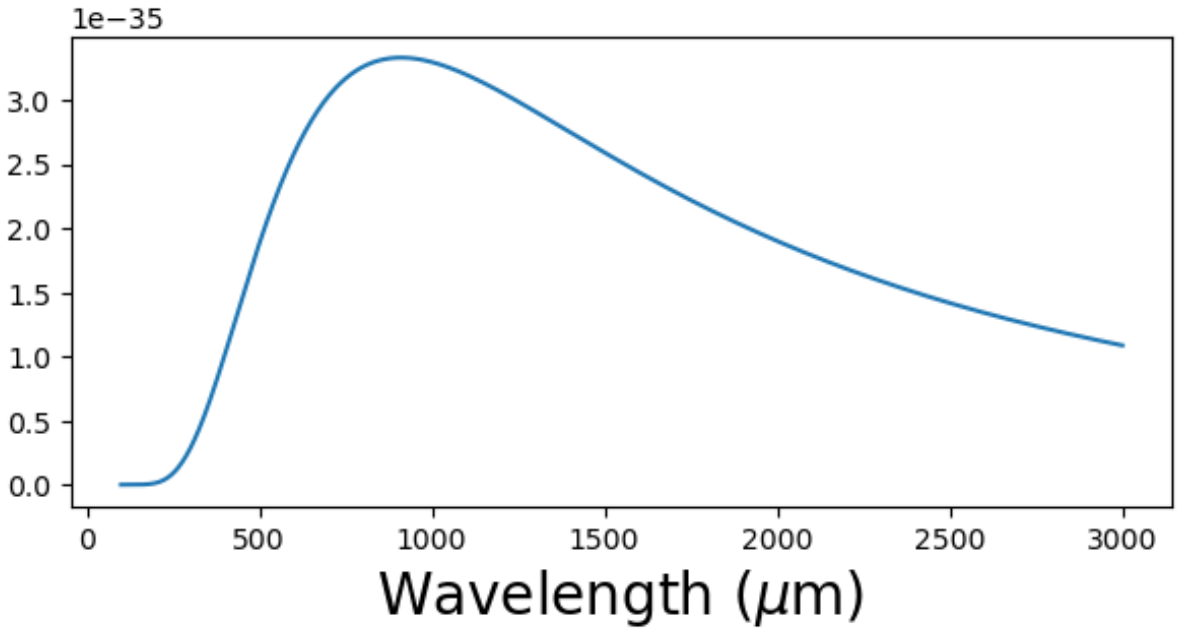
Out[5]: $5.6793093 \times 10^{-11} \; \mathrm{\frac{erg}{s\,cm^{2}}}$

In [6]:
```
def Bnu(T, nu):
    return 2 * ac.h * nu**3 / ac.c**2 / (np.exp(ac.h * nu/(ac.k_B * T)
```

In [20]:
```
T = 5600 * u.K
wl = np.linspace(100, 3000, 1000) * u.nm
nu = ac.c / wl  # convert wavelength to frequency

B_plot = Bnu(T, nu)

fig, ax = plt.subplots(figsize=(7,3))
ax.plot(wl, B_plot)
ax.set_xlabel(r'Wavelength ($\mu$m)', fontsize=20);
```



In [12]:
```
B_plot[0]
```

Out[12]: $2.7607048 \times 10^{-42} \; \mathrm{\frac{J\,m}{nm^{3}}}$

In [15]:
```
B_plot.to(u.erg / u.s / u.cm**2 / u.Hz)[0]
```

Out[15]: $2.7607048 \times 10^{-12} \; \mathrm{\frac{erg}{Hz\,s\,cm^{2}}}$

In [17]:
```
p = 2 * u.arcsec # should convert to half a parsec
d = p.to(u.pc, equivalencies=u.parallax())
d
```

Out[17]: $0.5 \; \mathrm{pc}$

In [18]:
```
nu = wl.to(u.Hz, equivalencies=u.spectral())
nu[0]
```

Out[18]: $2.9979246 \times 10^{15} \; \mathrm{Hz}$