# ExoEarth Finder

by Aki Roberge (NASA GSFC)

## 1 Load the packages

In [1]:
```
%matplotlib inline
import matplotlib.pyplot as plt
import numpy as np
```

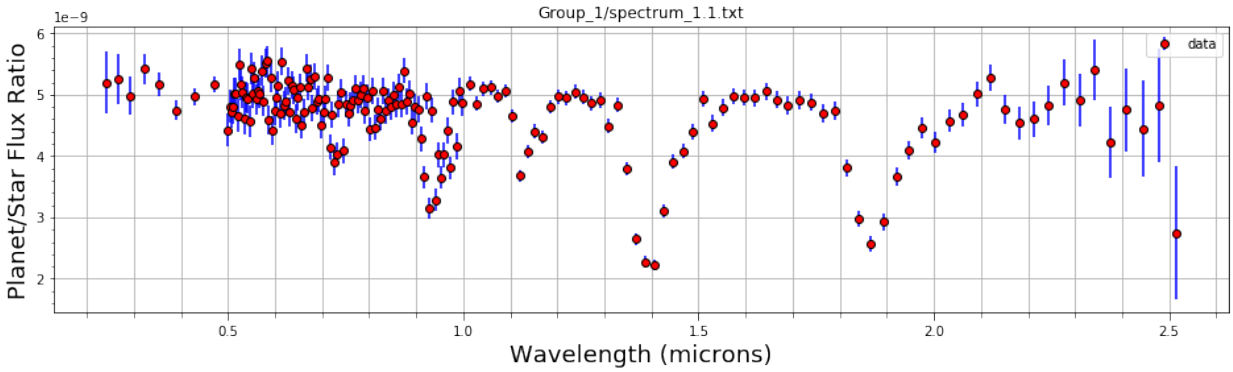
## 2 Load the data

In [16]:
```
datafile = 'Group_1/spectrum_1.1.txt'
           # Change the group number based on your group
           # and the filename to loop through spectra 1 through 4
data_array = np.loadtxt(datafile)
wave = data_array[:,0]
flux = data_array[:,1]
error = data_array[:,2]
```

## 3 Plot the data

In [17]:
```
fs = 18 # set fontsize for plotting
plt.figure(figsize=(16,4))
plt.errorbar(wave, flux, yerr=error, fmt='ko', label='data', mfc='red', ecolor='blue')
plt.title(datafile)
plt.grid(axis='x',which='both')
plt.grid(axis='y',which='major')
plt.minorticks_on()
plt.tick_params('x', length=6, which='major')
plt.tick_params('x', length=4, which='minor')
plt.xlabel('Wavelength (microns)', fontsize=fs)
plt.ylabel('Planet/Star Flux Ratio', fontsize=fs)
plt.legend()
#plt.xlim([0.6,1.1])  # Zoom in by setting the x-axis and/or y-axis limits
#plt.ylim([0.0,2.0e-10])
```

Out[17]:
```
<matplotlib.legend.Legend at 0x11a3957b8>
```




## 4 Other information about the star and planet

```
In [18]: f = open(datafile)
         meta = f.readlines()[3:5]
         print(meta[0])
         print(meta[1])

#  Star = Sun, Distance = 5.0 parsec
#  Planet semi-major axis = 1.0 AU, Phase angle = 90.0
```

## 5 Identify gaseous molecular absorption features

Try the Virtual Planet Lab Molecular Spectra Search Engine. Also, it can help to compare one planet to another to see what features they have in common.

http://vplapps.astro.washington.edu/vplrangemicro

## 6 What am I looking at?

- Is the planet large or small?
- What molecules are present in the atmosphere?
- What kind of planet is this? Compare to the others.
- Is this a habitable planet candidate?
- Are there any potential biosignatures?
- Flag for follow-up observations? Explain why.