Activity 6: Color Matching Functions From rgb to xyz

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Goal

To be able to compute CIE-xy chromaticity of a blackbody and plot in CIE-xy chromaticity diagram

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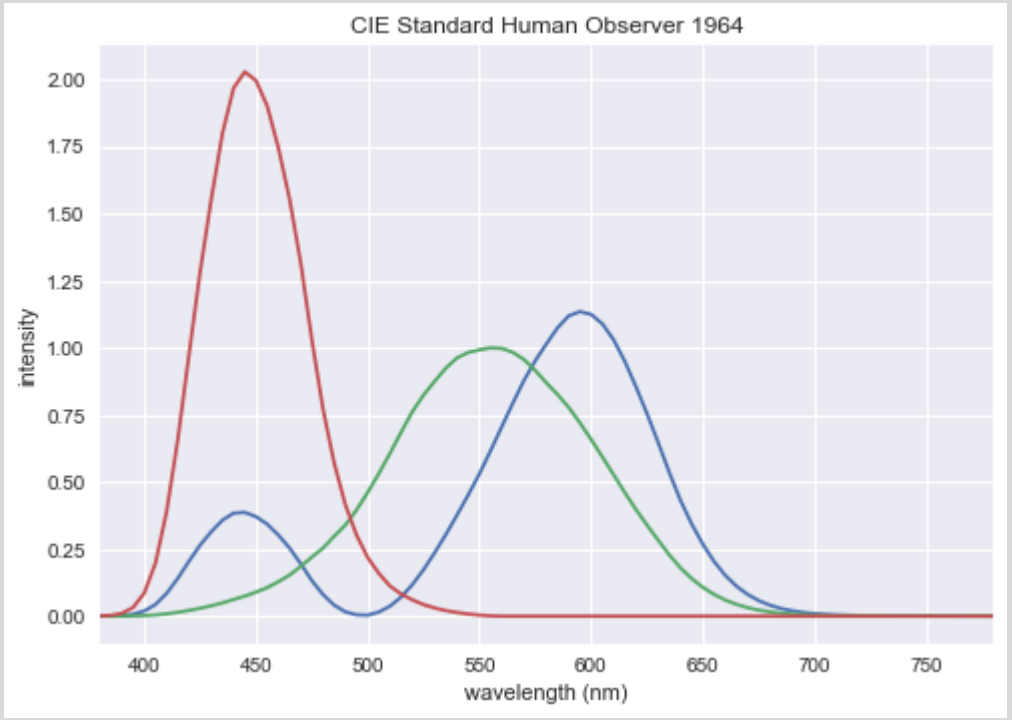

CIE Standard Human Observer 1964

This is made possible by just downloading the csv file and simply graphing it using Python.

```
w,x,y,z = np.genfromtxt('cie1964.csv', delimiter=',', unpack=True)
plt.plot(w, x,
         w, y,
         w, z)
```

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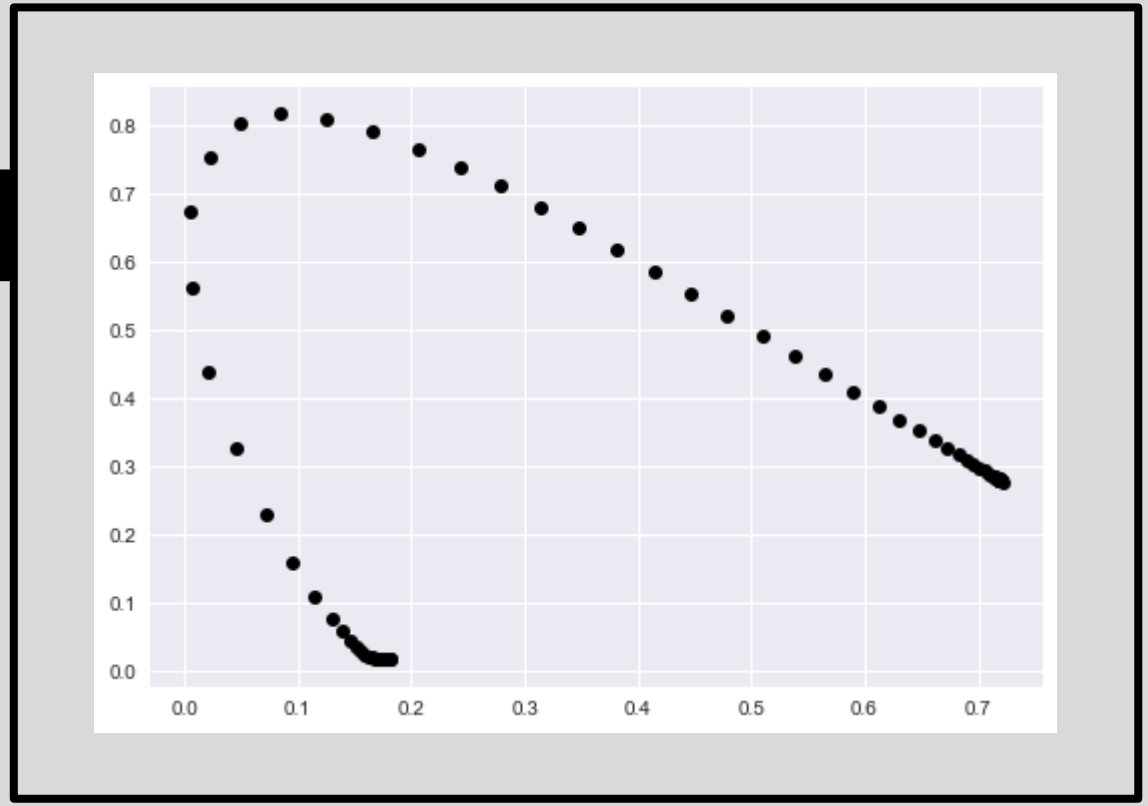
In [119]:
```
xbound, ybound = [], []
for i in range(len(w)):
    x1, y1, z1 = spec2xyz(w[i], [x[i], y[i], z[i]])
    xbound.append(x1)
    ybound.append(y1)
```

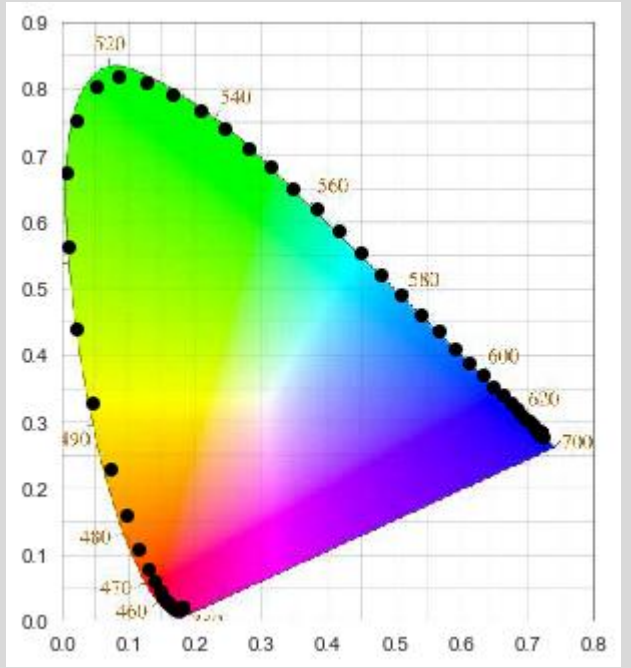
executed in 5ms, finished 19:38:25 2019-09-11

In [120]:
```
cie = cv2.imread('cie.jpg')
plt.imshow(cie, extent=(0.0, 0.8, 0.0, 0.9))
plt.plot(xbound, ybound, 'ko')
plt.grid(0)
plt.show()
```

Python coding

Given that we have encountered such programming activity, we have used our own function of spec2xyw to make the graphing possible. Bounds for x and y were obtained from the original file.





Results

I was able to know the boundaries from the python algorithm and was able to graph it embedded on the image.

Note: The colors in the picture were inverted. For this activity, assume the inverse of colors.

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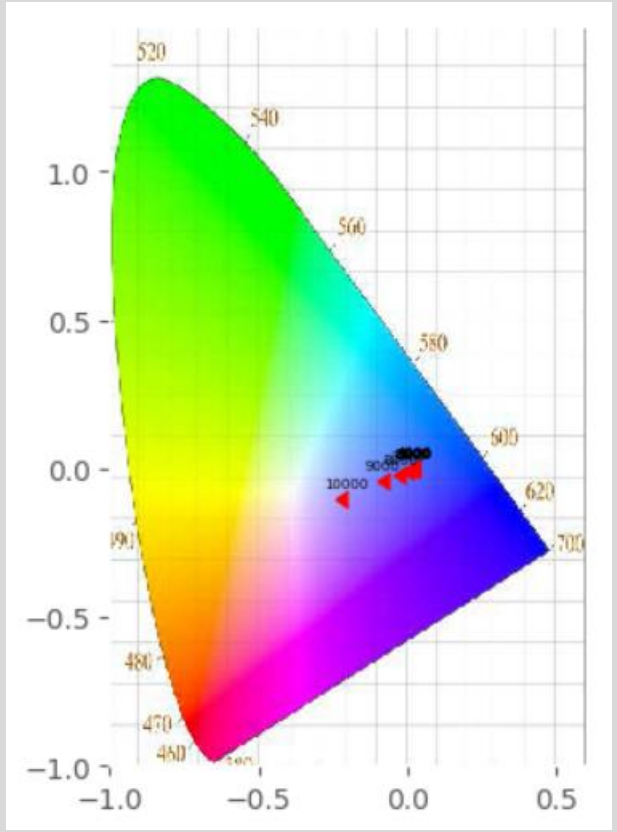

Results

In this part, we compute the CIE-xy chromaticity of a blackbody emitting from 1 000 K to 10 000 K in steps of 1 000 K. It was then plotted with an embedded image. The collection of points showing an arc is known as the Planckian Locus.

Although the arc is not that visible, probably an error with the spacing, but you can see that the values decrease towards the right. This path shows how the color of an incandescent black body changes as the temperature of blackbody changes also. Theoretically, it goes to red at low temperatures while at high temperatures, it goes to blue.

Note: The colors in the picture were inverted. For this activity, assume the inverse of colors.

Summary

The activity was straight to the point yet hard to do. I encountered a problem of not being able to convert all the colors so the point were misplaced if you did not read the *note*. Although, the first part of the problem, I was able to pull it off with a nicely done implemented boundaries on the images.

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References

- Data from Activity 3 (AP 187)
- Soriano, M. Color Order System and Color Matching Functions, Applied Physics 187

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