HW10_soln

April 17, 2023

[ ]:
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import matplotlib.pyplot as plt
import numpy as np
from astropy.io import fits
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[ ]:
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data = fits.open("reduced.fits")
img = data[0].data
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[ ]:
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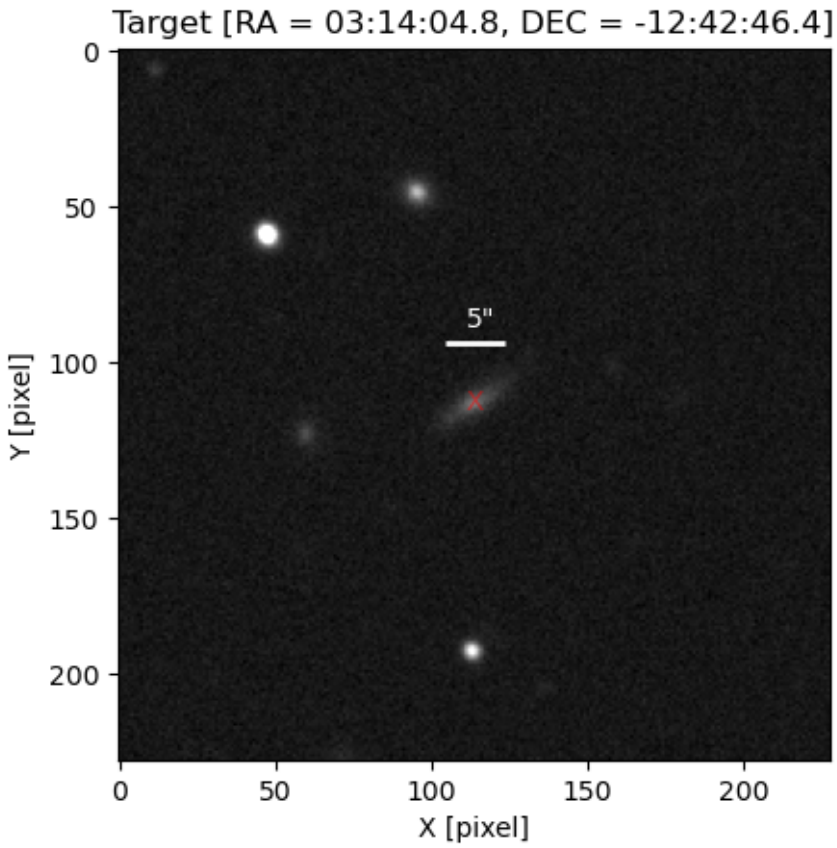
arcsec_per_pixel = .263
pixels_per_arcsec = 1 / .263
target_img_coords = [1130, 2224]
pixels_per_arcmin = int(60 / .263)
pm = pixels_per_arcmin // 2
img_slice = img[2224-pm:2224+pm, 1130-pm:1130+pm]
x_center = img_slice.shape[0] // 2
y_center = img_slice.shape[1] // 2
plt.imshow(img_slice, cmap = 'gray', norm = 'log', vmin = 3e2, vmax = 1e3)
plt.hlines(y_center - 20, xmin = x_center - 2.5*pixels_per_arcsec, xmax =␣
 ↪x_center + 2.5*pixels_per_arcsec, color = 'white', lw = 2)
plt.text(x_center - 3, y_center - 25, "5\"", color = 'white')
plt.text(x_center-3, y_center+1, 'X', color = 'r', alpha = .5)
plt.xlabel("X [pixel]")
plt.ylabel("Y [pixel]")
plt.title("Target [RA = 03:14:04.8, DEC = -12:42:46.4]")
plt.savefig("target.jpeg", dpi = 300)
plt.show()
```



Z = $\frac{\lambda_{obs}-\lambda_{emittted}}{\lambda_{emitted}} = .8$

$\lambda_{emitted} = 3728$ A

$\boxed{\lambda_{obs} = 3728 \cdot .8 + 3728 = 6710.4\ A}$

$\frac{v}{c} = \frac{3729.875-3727.092}{3729.875}$

$\boxed{v = 223.841\ km/s}$

$\Delta\lambda_{obs} = (1+Z)\Delta\lambda_{emitted}$

$= 1.8 * 2.783 = \boxed{5.01\ A}$

Since Gemini-South operates in the IR/optical, we want the hour angle of the target to be 0 when solar time is approximately 0. Local siderreal time is 0 on September 23. Now, since the target's RA is 3 hours, find when its HA will be 0. For the object to traverse 3 hours, or 45 degrees, it will take 45/360 * 365 = 46 days. This puts us at November 7th or 8th