Image Analysis

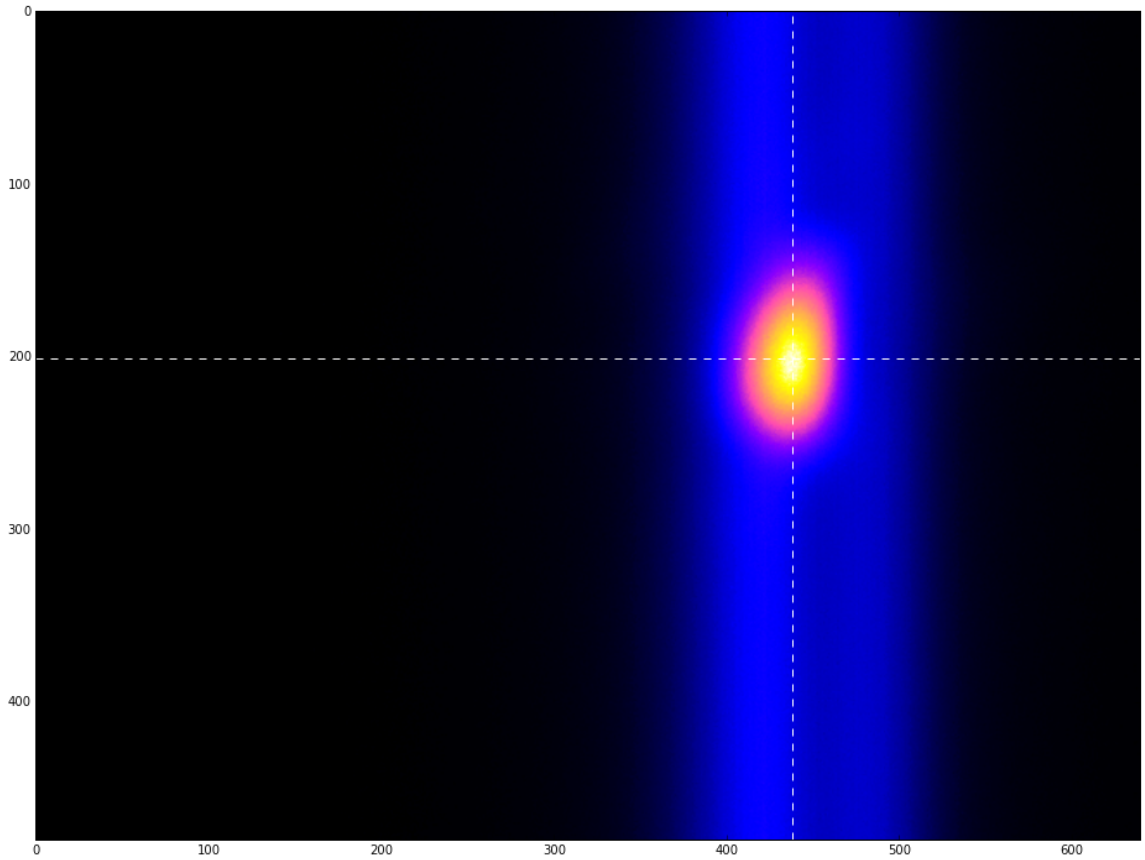
created: 2019/June/21
KI
For analyzing some images taken at the AS port.

In [18]:
```
from PIL import Image
import matplotlib.pyplot as plt
import numpy as np
%matplotlib inline
```

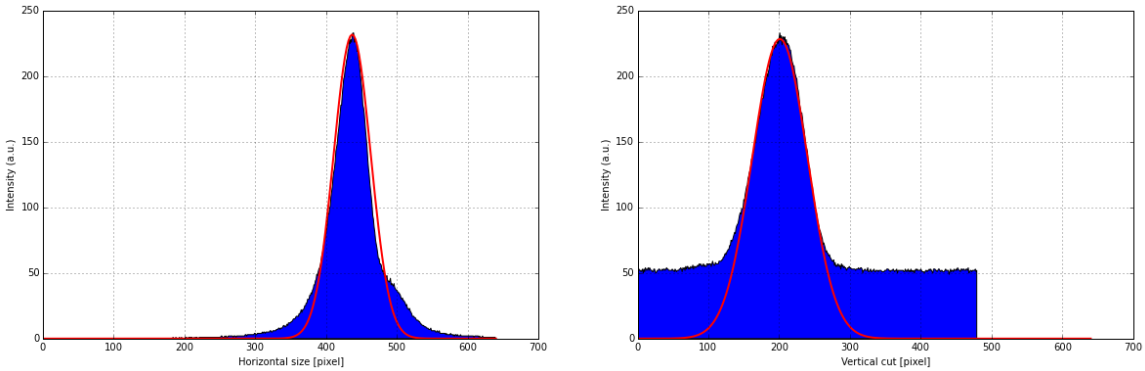
In [93]:
```
def mygauss (xvec, x, sigma):
    return 1./np.sqrt(2*np.pi*sigma**2) * np.exp(-(xvec-x)**2/sigma*
*2)
```

In [38]:
```
# list of images
file1 = '/kagra/camera/images/okome_ITMX.tiff_AS_2019-06-20-15-01-32
.tiff' # exp=20, with Enomoto align, ITMX bounce
file2 = '/kagra/camera/images/okome_ITMX2.tiff_AS_2019-06-20-15-01-4
3.tiff' # exp = 10, the same as above
file3 = '/kagra/camera/images/okome_ITMX3.tiff_AS_2019-06-20-15-16-1
7.tiff' # exp = 20, with anti-Enomoto, ITMX bounce
file4 = '/kagra/camera/images/okome_ITMX4.tiff_AS_2019-06-20-15-16-3
1.tiff' # exp = 10, the same as above
img_ = plt.imread(file2)

# convert the data into array
img_arr = np.asarray(img_)
```

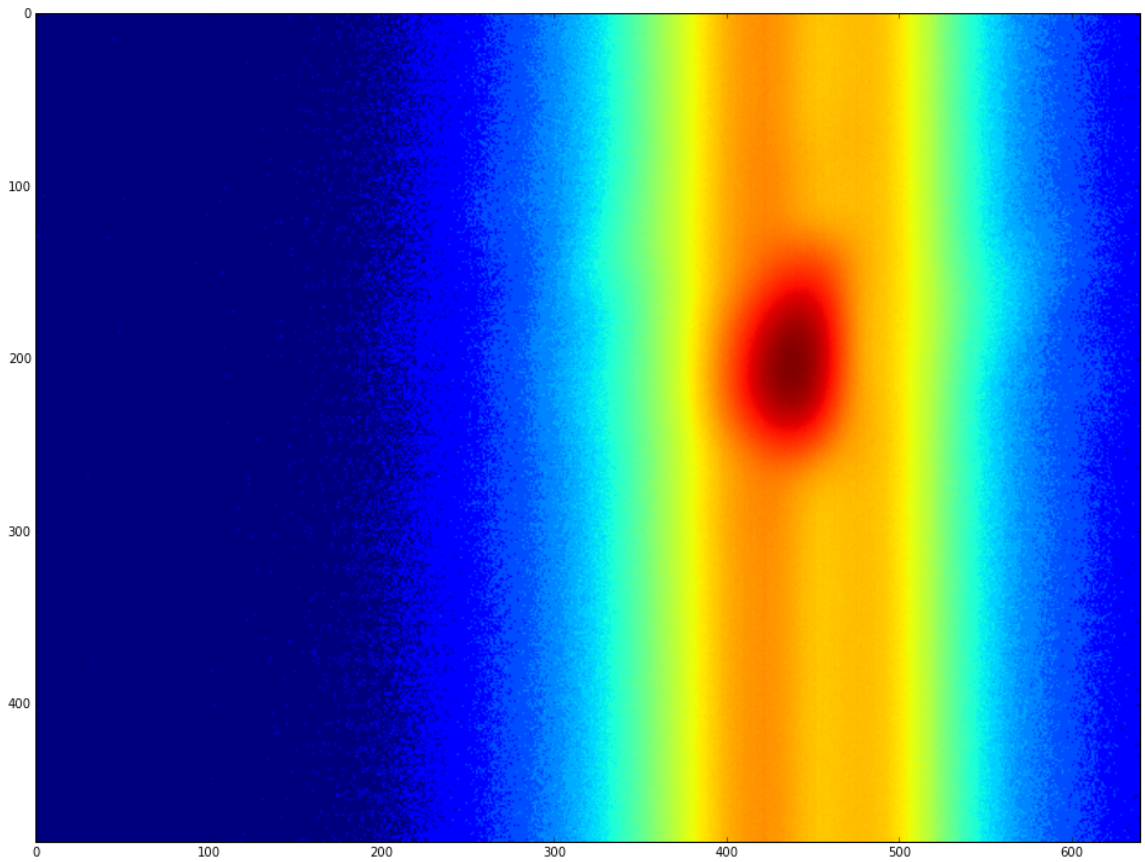
In [143]:
```
vpixel = 438
hpixel = 201
plt.figure(1010, figsize=(16,16))
plt.imshow(img_, cmap="gnuplot2")
plt.axvline(vpixel, ls='--', color='w')
plt.axhline(hpixel, ls='--', color='w')
plt.savefig('AS_exp10_20190621.png', transparent=True)
plt.show()
```



In [145]:
```
plt.figure(101, figsize=(20, 6))
plt.subplot(121)
#plt.plot(np.arange(len(img_arr[hpixel,:])), img_arr[hpixel,:])
plt.fill_between(np.arange(len(img_arr[hpixel,:])), img_arr[hpixel,:
], 0)
x = np.linspace(0, len( img_arr[hpixel, :] ), 256)
plt.plot(x, mygauss(x, 437, 37)*21500, lw=2, color='r')
plt.xlabel('Horizontal size [pixel]')
plt.ylabel('Intensity (a.u.)')
plt.grid()

plt.subplot(122)
#plt.plot(img_arr[:, vpixel])
plt.fill_between(np.arange(len(img_arr[:, vpixel])), img_arr[:, vpix
el], 0)
plt.plot(x, mygauss(x, 201, 55)*31500, lw=2, color='r')
plt.xlabel('Vertical cut [pixel]')
plt.ylabel('Intensity (a.u.)')
plt.grid()
plt.savefig('beamprofile_AS_ITMXsinglebounce_20190621.png', transpar
ent=True)
plt.show()
```



In [74]:
```
plt.figure(101, figsize=(16, 16))
plt.imshow(np.log( img_arr+1), cmap="jet")
plt.show()
```



In [141]:
```
Tp = 0.1
rp = np.sqrt(1.0-Tp)
Ti = 0.0046
L = np.linspace( 0.01, 0.5, 256)
ri = np.sqrt(1. -Ti - L)
rr = -rp + Tp*ri/(1-rp*ri)

Gp = Tp/(1.0 -rp * ri)**2



plt.figure(10, figsize=(16, 8))
plt.subplot(121)
plt.plot(L, Gp, lw=2, color='r')
plt.axhline(3.0)
plt.grid()

plt.subplot(122)
plt.plot(L, rr**2, lw=2)
plt.show()
```