High Level Scripting
Part II

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PyROOT

```
from ROOT import gROOT, TCanvas, TF1


gROOT.Reset()
c1 = TCanvas( 'c1', 'Example with Formula', 200, 10, 700,
    500 )
fun1 = TF1( 'fun1', 'abs(sin(x)/x)', 0, 10 )
c1.SetGridx()
c1.SetGridy()
fun1.Draw()
c1.Update()
raw_input()
```

Basic libraries

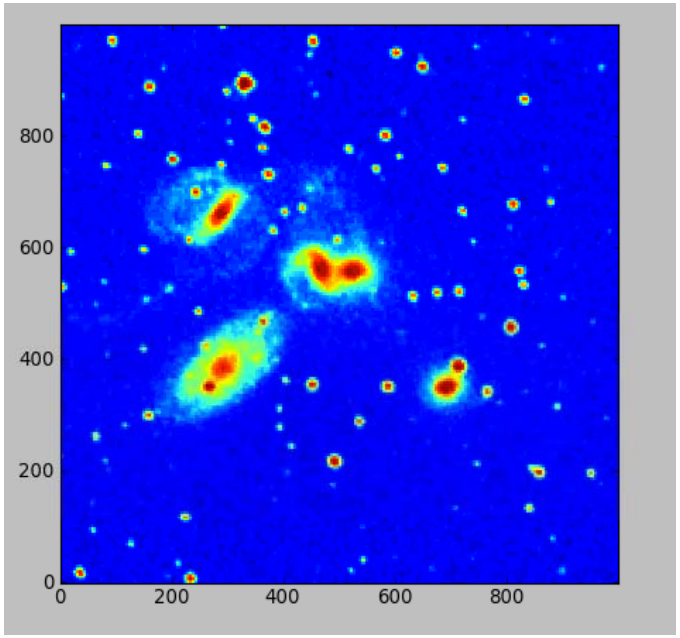
- Numpy (http://numpy.scipy.org/)
- Matplotlib (http://matplotlib.sourceforge.net/)
- Scipy (http://www.scipy.org/; http://www.scipy.org/Download)
- Pyfits (http://www.stsci.edu/resources/software_hardware/pyfits)

Reading and displaying FITS images

```
>>> import pyfits
>>> pyfits.info('Stephan\'s_Quintet.fits')
Filename: Stephan's_Quintet.fits
No.    Name         Type      Cards   Dimensions   Format
0    PRIMARY     PrimaryHDU     149  (1000, 1000)  float32
>>> im,hdr=pyfits.getdata('Stephan\'s_Quintet.fits',header=True)
>>> print hdr
SIMPLE  =                    T / Written by SkyView Thu Jul 15 15:00:57 GMT 2010
BITPIX  =                  -32 / 4 byte floating point
NAXIS   =                    2 / Two dimensional image
NAXIS1  =                 1000 / Width of image
NAXIS2  =                 1000 / Height of image
CRVAL1  =            338.98963 / Reference longitude
CRVAL2  =             33.95991 / Reference latitude
RADESYS = 'FK5     '           / Coordinate system
EQUINOX =               2000.0 / Epoch of the equinox
CTYPE1  = 'RA---TAN'           / Coordinates -- projection
CTYPE2  = 'DEC--TAN'           / Coordinates -- projection
CRPIX1  =                 500.5 / X reference pixel
CRPIX2  =                 500.5 / Y reference pixel
CDELT1  =  -0.0001000000000000 / X scale
CDELT2  =   0.0001000000000000 / Y scale
. . . .
. . . .
```

Reading and displaying FITS images

```
>>> im.shape=(hdr['NAXIS2'],hdr['NAXIS1'])
>>> import pylab as pl
>>> pl.imshow(im,cmap=pl.cm.jet,origin='lower',interpolation='bilinear')
<matplotlib.image.AxesImage object at 0x14db93d0>
>>> pl.show()
```



Reading and displaying FITS images

```
#!/usr/bin/env python

import pyfits
import pylab as pl
import sys
filename=raw_input("Insert FITS file name>")
row=int(raw_input("Insert the row to be plotted>"))
pyfits.info(filename)
im,hdr=pyfits.getdata(filename,header=True)
pl.plot(im[row])
pl.show()
print "plot saved in test.png"
pl.savefig("test.png")
```

Reading FITS tables

```
#!/usr/bin/env python

import pyfits
import pylab as pl
import sys
filename=raw_input("Insert FITS file name>")
pyfits.info(filename)
table=pyfits.open(filename)
ext=int(raw_input("Insert FITS extention(0,1,.)>"))
names = table[ext].columns.names
print names
name=raw_input("Insert the columns to be plotted>")
myData = table[ext].data.field(name)
lin=int(raw_input("Lin(1) or Log(2) plot>"))
if lin==1:
     pl.hist(myData,30)
     pl.xlabel("%s"%name)
else:
     pl.hist(pl.log10(myData),30)
     pl.xlabel("Log(%s)"%name)
pl.ylabel("counts")
pl.show()
```