NHSC/PACS Workshop

PACS Spectrometer Hands-on

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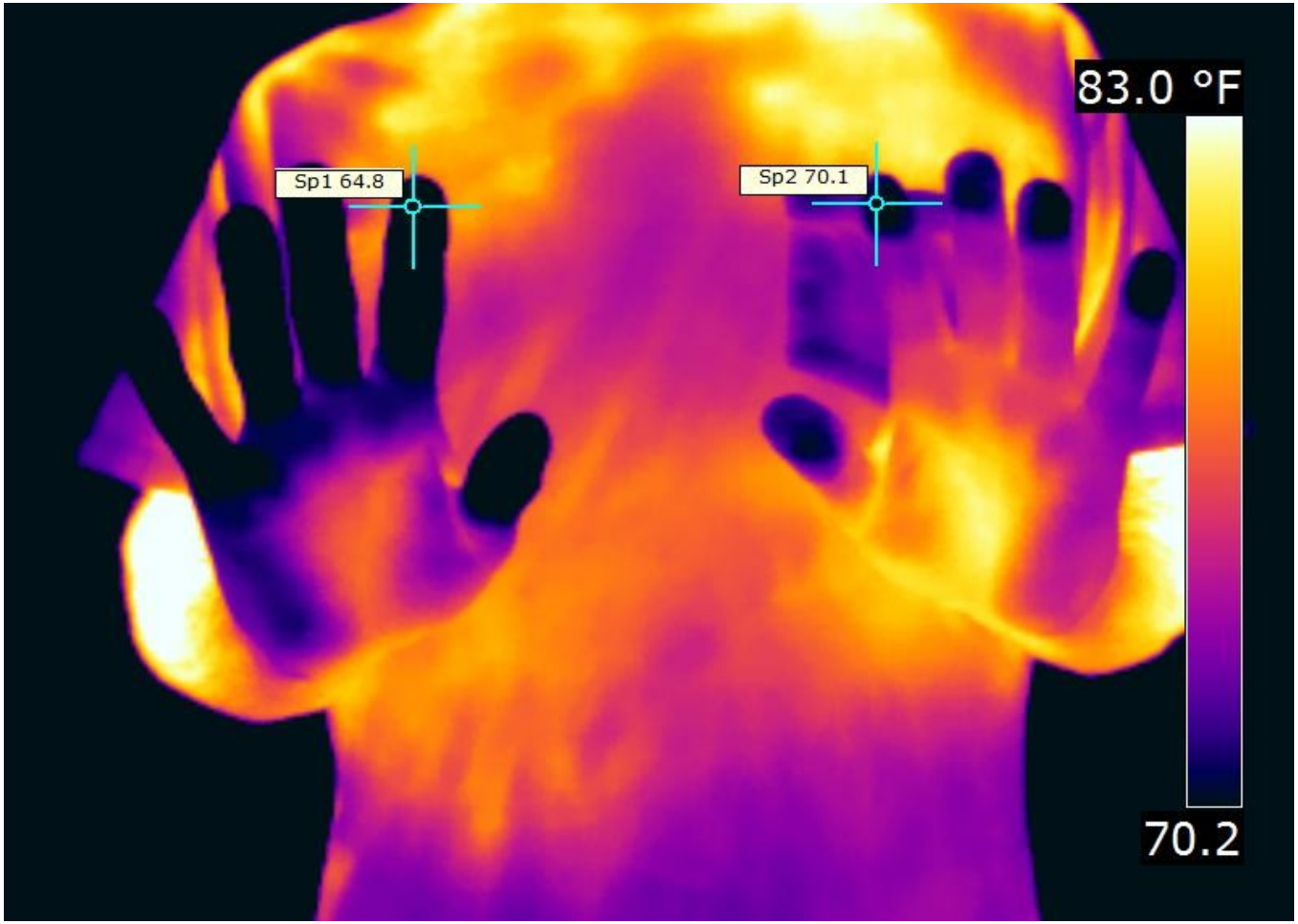

Actually: hands-on with infrared data !

Maskviewer

A) Access your slicedFrames structure:

```
restore("/home/fadda/workspace/PACS/Workshops/2013A/slicedFrames.ser")
```

B) Start the MaskViewer for slice number "0"

```
MaskViewer(slicedFrames.get(0))
```

Modify masks

```
# Mask part of the signal

frame=slicedFrames.get(0)
for i in range(101):
  frame.setMask("GLITCH",12,12,i,True)

# Once you have done all editing and checked them,
# Replace the original Frames with the edited one

slicedFrames.replace(0,frame)
```

In this example we mask part of the GLITCH mask.
Reobserve this with the MaskViewer and find the part you just masked !

What is in this observation ?

```
# Get the observation

obs   =getObservation("1342186799",verbose=True,useHsa=0,\
poolLocation="/home/fadda/workspace/PACS/Workshops/2013A/")

# Explore

obsSummary(obs)
```

Explore one observation (from the previous talk).
Which lines have been observed ?
In which mode ?

Plot the coordinates

```
# Get the ON and OFF slices

on = slicedFrames.refs[0].product
off = slicedFrames.refs[1].product


# Plot RA-Dec of on and off (differents slices)
# and compute the median difference of the coordinates

RaOn = on.ra[12,12,:]
DecOn = on.dec[12,12,:]
RaOff = off.ra[12,12,:]
DecOff = off.dec[12,12,:]

p1 = PlotXY(RaOn,DecOn)
p2 = PlotXY(RaOff,DecOff)
```

Discover the jittering

```
Ra0 = MEDIAN(RaOn)
Dec0 = MEDIAN(DecOn)
RaOn  -= Ra0
DecOn -= Dec0
RaOn = RaOn * 3600. *COS(Dec0*3.1415/180.)
DecOn *= 3600.
p3 = PlotXY(RaOn,DecOn)
```

Pointing during the ON source slice wrt to the median pointing in units of arcseconds.

Histogram of the RA

```
from herschel.ia.numeric.toolbox.basic import Histogram
from herschel.ia.numeric.toolbox.basic import BinCentres
binsize = 0.03
hist = Histogram(binsize)
bins = BinCentres(binsize)
p = PlotXY(bins(RaOn),hist(RaOn))
p.style.chartType = Style.HISTOGRAM
```

Plot an histogram with a bin-size 0.03 of the R.A. during the observation (ON position). This shows that the jittering is around 1 arcsec.

Overplot the Gaussian function

```
# MEDIAN and MAD
med = MEDIAN(RaOn)
mad = MEDIAN(ABS(RaOn - med)) * 1.4826  # See wikipedia ...
print "MEDIAN ", med
print "MAD ", mad

# Overplot Gaussian on the histogram
peak = RaOn.length() * (SQRT(2 * 3.1415) * mad)
g=GaussModel(parameters=Double1d([peak, med, mad]))
b = bins(RaOn)
p.addLayer(LayerXY(b, g(b)))
```

Wavelength scan

```
# Plot the wavelength of the ON slice

won =on.wave[12,12,:]
PlotXY(won)
```

Plot the wavelegth as function of the ramp number.
See how the wavelength range has been scanned.

Where is my time ?

 # Time is in the status (print on.getStatus())

```
time = on.getStatus("FINETIME")
```

 # Time is in Julian time in units of 1E-6 s

```
time -= time[0]
time /= 1.e6

p = PlotXY(time,won)
```

The time is contained in FINETIME. So fine that is expressed in million-th of seconds !
Here we plot the wavelength as function of time (from the start of the observation).

Check your RSRF

```
# Get the caltree
cal=getCalTree()

# Check its structure
print cal.spectrometer.rsrfR1

# Print response versus grating
gr= cal.spectrometer.rsrfR1["gratpos"].data
resp= cal.spectrometer.rsrfR1["response"].data
PlotXY(gr,resp[:,12,12])
```

You can clearly see that the bump due to the leakage is still present !

Challenges


DAMN you, IKEA! why don't you also provide good tools and documentation?
CONTENT PLATFORM
Soulcie

Challenge # 1

```
# In the data, we add an absorption line

q = maskOn == 0
indm=q.where(q)
w = won[indm]
s = sdiff2[indm]
ids=Selection(SORT.BY_INDEX(w))
w = w[ids]
s = s[ids]

xw = (w-205.6)/sigma0
absLine = -5. * (EXP(-xw*xw/2.))
s += absLine

p = PlotXY(w,s,line=Style.NONE,symbol=Style.DOT)

# Problem: Fit the two lines.
```

Challenge # 2

 # Problem: consider only a subsample of masks and use
 # redundancy to reject outliers
 # HINT: Don't consider the GLITCH mask and redefine maskOn

 # Display the signal and model

 # Fit the line iteratively rejecting outliers