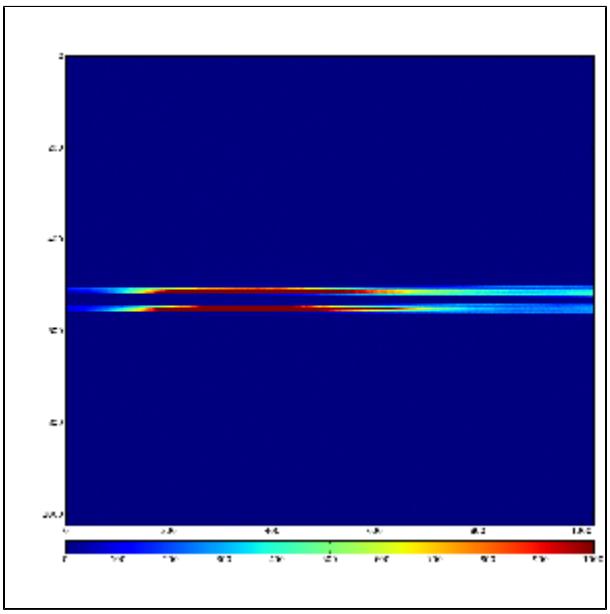
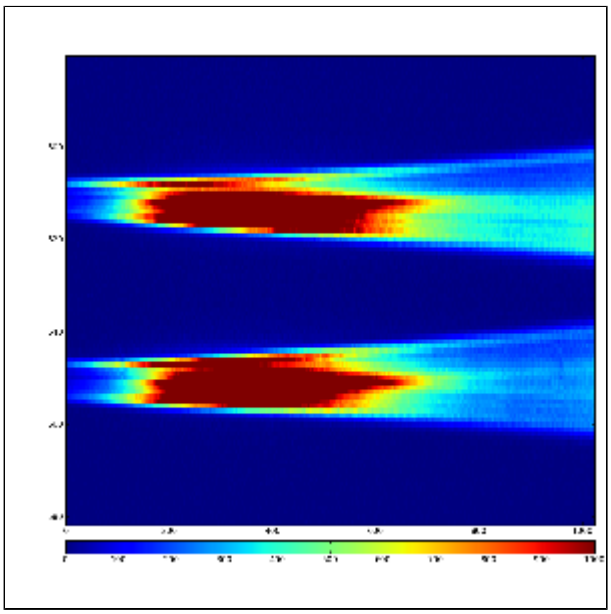
Differential spectrum from Opal camera image

Motivation

- 2012-09-13 14:00 - Mtg with Ryan Coffee, Josef Frisch, Nick Hartmann
- Would like to have psana application to process xppi0412 data





Psana configuration file to get image:

```
[psana]
files         = \
/reg/d/psdm/xpp/<experiment>/xtc/<file-1>.xtc \
/reg/d/psdm/xpp/<experiment>/xtc/<file-2>.xtc \
...
/reg/d/psdm/xpp/<experiment>/xtc/<file-N>.xtc

modules       = \
                 ImgAlgos.CameraImageProducer \
                 ImgAlgos.SaveImageInFile
#                psana_examples.DumpOpal1k \
events          = 3

[ImgAlgos.CameraImageProducer]
source          = DetInfo(:Opal1000)
key_in          =
key_out         = img
subtract_offset = true
print_bits      = 15

[ImgAlgos.SaveImageInFile]
source        = DetInfo(:Opal1000)
key           = img
fname         = img-spectra
saveAll       = true
#eventSave     = 1
```

In order to run this script, the xtc file path and names should be substituted, then use commands:

> *sit_setup*
> *psana -c <the-name-of-the-configuration-file>*

Project of analysis-specific modules

Module producing spectra

Functionality

- Define and cut the spectral regions for signal and reference band.
- Integrate in columns and evaluate two 1024-bin spectra, fs and fr, and their relative difference r= 2(fs-fr)/(fs+fr).
- Put 3 spectra in the event as `ndarray<double,2>` object.
- Save spectra in the text file, 1024 x 3 lines of float numbers, if necessary.

Module parameters

- source
- key_in
- key_out
- Signal band Y-center
- Signal band width
- Signal band tilt angle
- Reference band Y-center
- Reference band width
- Reference band tilt angle
- Output file name (text format, 1024 x 3 lines of float numbers). If specified, then the file is saved for all selected events.

Module example for analysis of spectra

Functionality

- get the `ndarray<double,2>` object from the event.
- do iteration over vectors and print elements for example.

⚠ Then users extend this module functionality depending on their goal...

Module parameters

- source
- key_in
- other parameters for analysis or accumulation of statistics etc.