3rd sardana Workshop Feedback from scientists, DESY

3rd sardana Workshop

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HELMHOLTZ ASSOCIATION

DESY

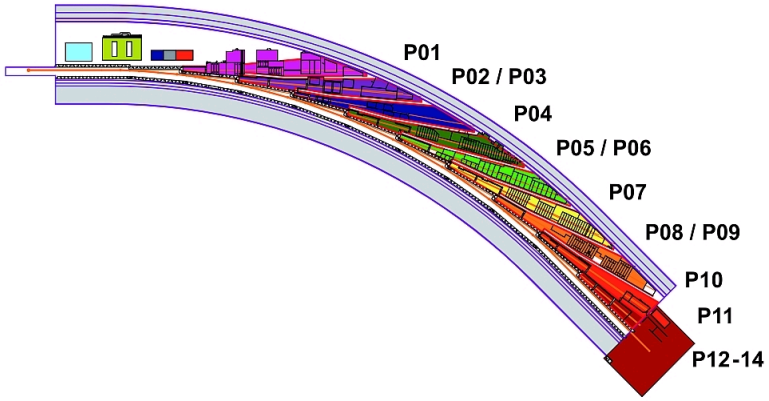
Outline

- Resonant Scattering and Diffraction beamline P09
- Experimental control at P09
- Feedback from scientists at PETRA III

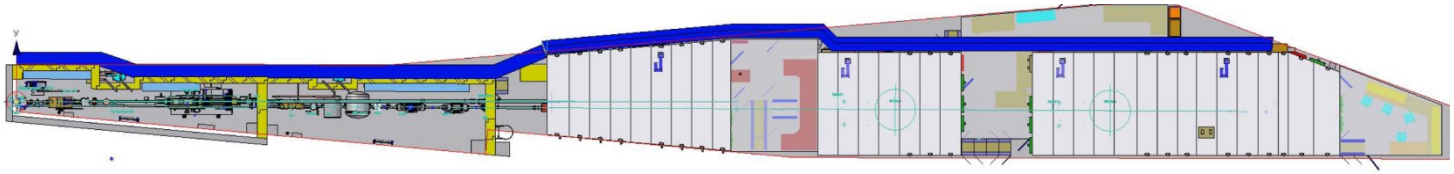
P09: Resonant scattering and diffraction beamline

> 1 optics hutch

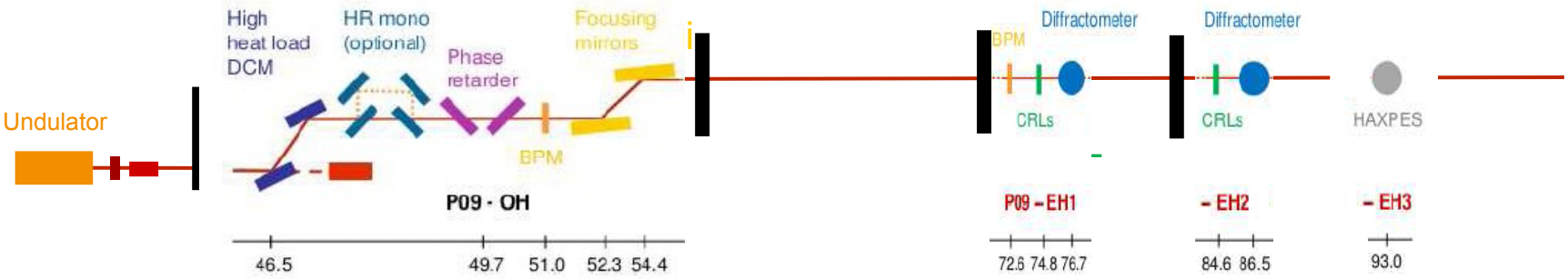
Monochromator:	DCM Si-(111)/(311)
Energy range:	2.7 – 24 (50) keV
Flux at 10 keV:	$2x10^{13}$ counts/sec
Focus size (moderate):	140 x 40 μm^2 (mirror)
(small):	40 x 4 μm^2 (compound refractive lenses)
Variable incident polarization:	double phase plates, linear/circular
Energy resolution:	< 1 eV, <0.3 eV



> 2 experimental hutches

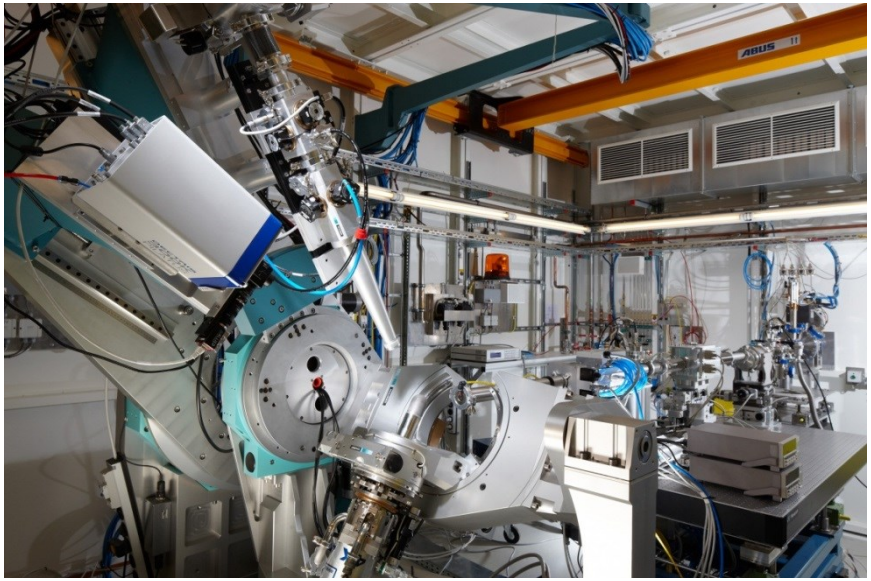


P09 Optic hutch | P08 EH | P09 EH1 | P09 EH2 | P09 EH3

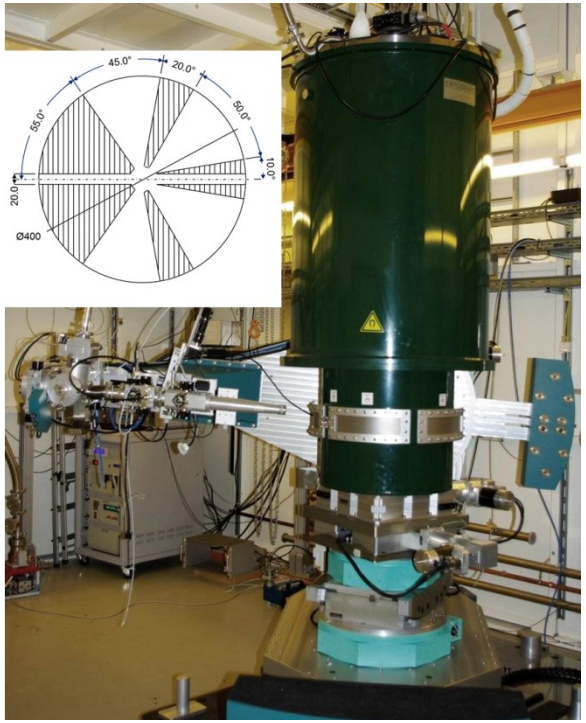


P09 : Resonant scattering and diffraction beamline

- EH1: High precision “4S+2D” 6-circle diffractometer



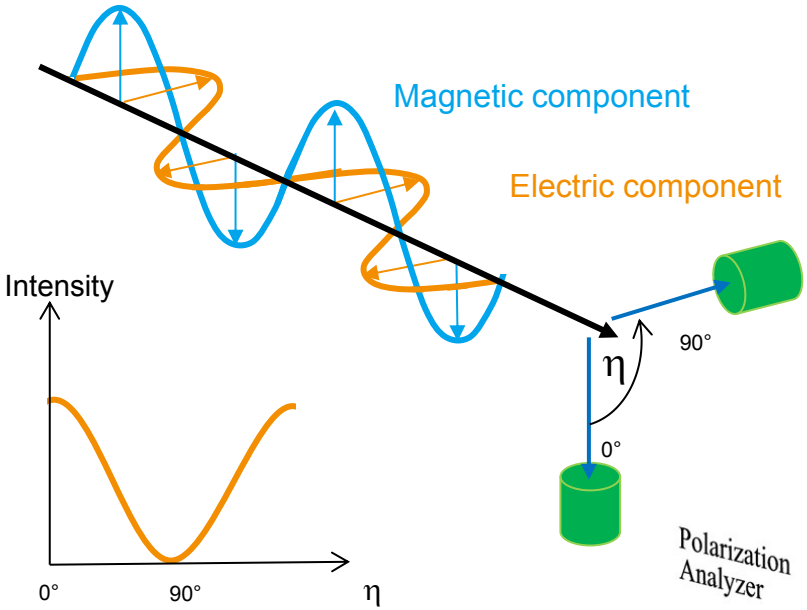
- EH2: non-magnetic heavy-load 6-circle diffractometer in horizontal Psi geometry

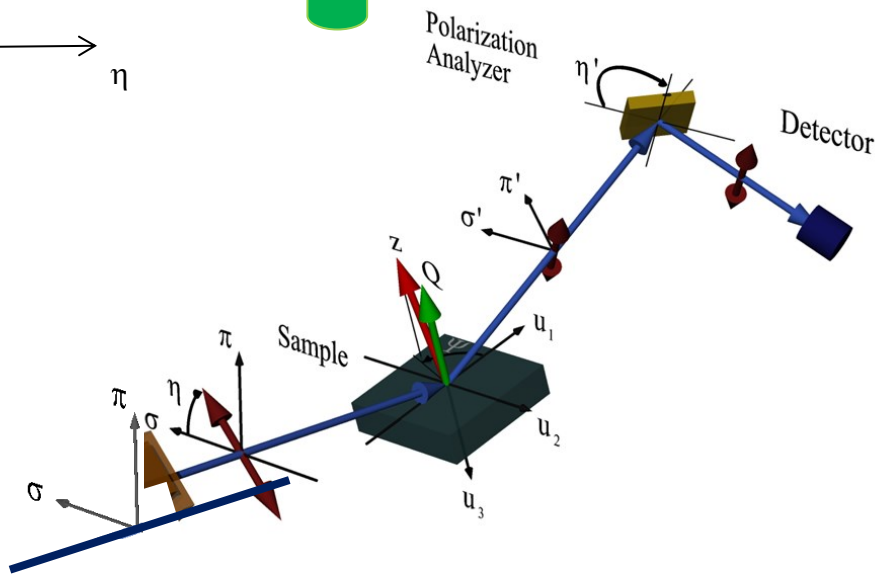


P09 : Typical experiment

- Select an energy (monochromator = master device) and focus size; Energy determines mirror cut-off and settings, phase retarder crystals which to use, analyzer crystals which to use, angular access in reciprocal space, attenuation factor of attenuator foils, CRLs combination, … (the slave devices)
- Mount the sample and orient it (2 Bragg peaks defining directions in reciprocal space)
- Search for magnetic / charge order / superlattice peaks in reciprocal space at temperatures of interest
- Probe behavior of those peaks upon applying temperature / magnetic field / pressure / electric field
- Probe behavior of those peaks upon varying azimuthal / angle of incident linear polarization / incident energy for the purpose of magnetic structure determination

P09: Polarization analysis





Poincaré-Stokes parameters:

$$P_1 = (|E'_\sigma|^2 - |E'_\pi|^2)/P_0 = (I_{\sigma'} - I_{\pi'})/I_0$$
$$P_2 = 2\mathrm{Re}(E'^*_\sigma E'_\pi)/P_0 = (I_{+45^\circ} - I_{-45^\circ})/I_0$$
$$P_3 = 2\mathrm{Im}(E'^*_\sigma E'_\pi)/P_0$$
$$P_1^2 + P_2^2 + P_3^2 \leq 1$$

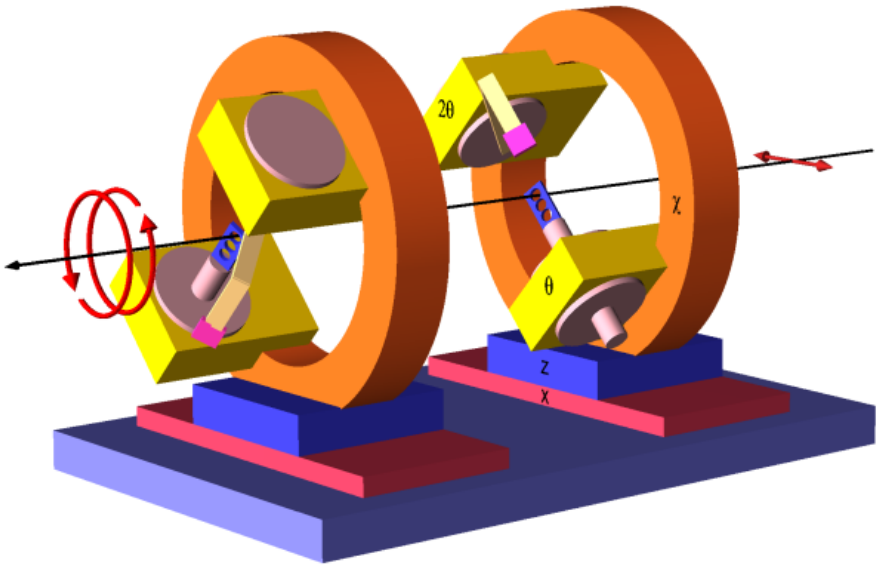
Crystals available for polarization analysis fro

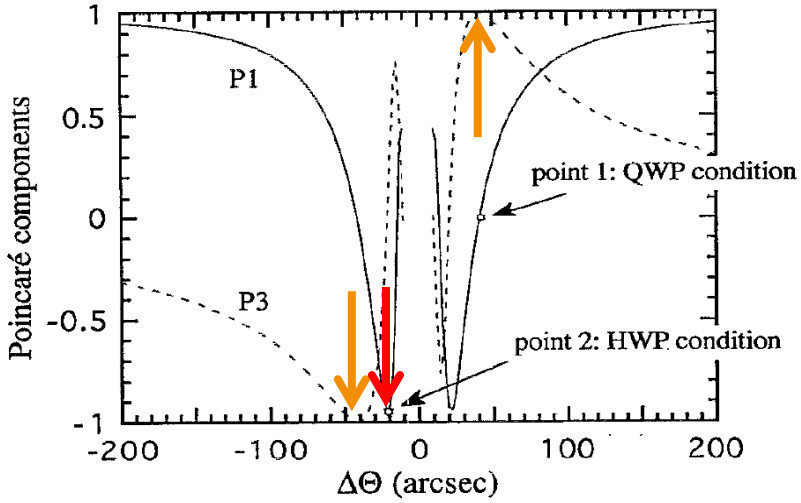
Crystal	(h k l)	d (Å)	E (90°) (keV
Graphite	(0 0 2)	3.358	2.61
$TbMnO_3$	(0 2 0)	2.928	2.99
Al	(1 1 1)	2.338	3.75
Cu	(1 1 1)	2.084	4.21
Graphite	(0 0 4)	1.679	5.22
Mo	(2 0 0)	1.574	5.57
Al	(2 2 0)	1.432	6.12
Cu	(2 2 0)	1.276	6.84
Al	(2 2 2)	1.169	7.50
Graphite	(0 0 6)	1.119	7.83
Cu	(2 2 2)	1.042	8.41
Pt	(4 0 0)	0.981	8.94
Graphite	(0 0 8)	0.839	10.44
Al	(3 3 3)	0.779	11.25
Graphite	(0 0 10)	0.671	13.05

P09: variable incident polarization

Circular polarization in energy range between 2.7 – 14 keV using

→ thin Si-plates (5 - 10 μm): 2.7 – 3.2 keV
→ diamond plates (100 – 900 μm): 3.2 – 14 keV

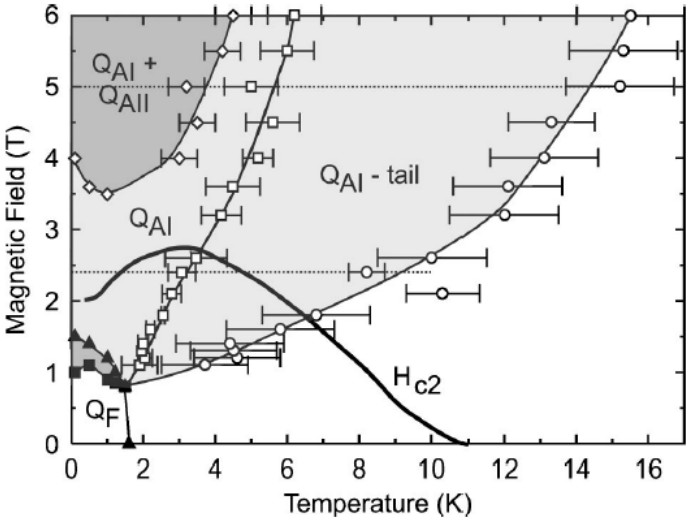


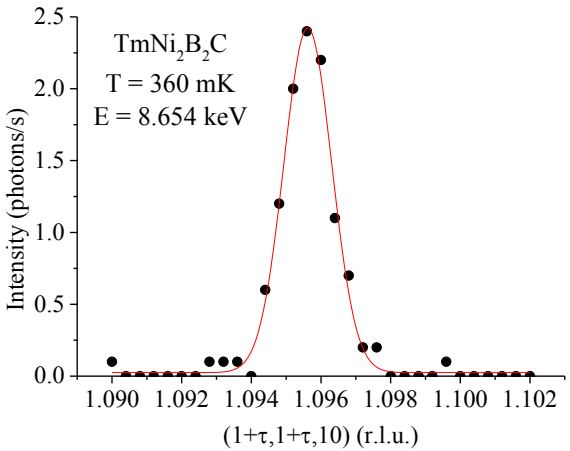


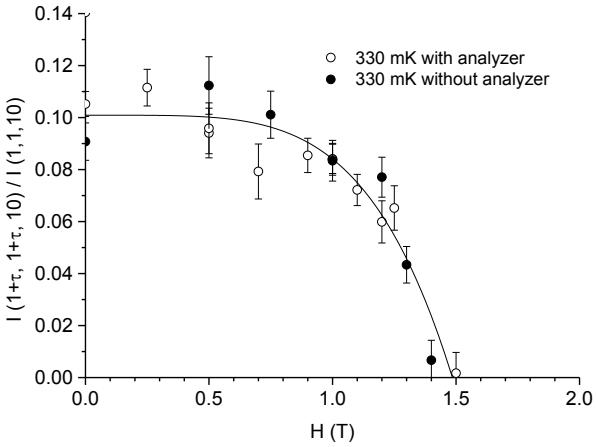
$$\Delta\Phi = -\frac{\pi}{2}\frac{r_e^2\lambda^3\,\mathrm{Re}\left[F_h F_h^-\right]\sin(2\theta)t}{\left[\pi V\right]^2\Delta\Theta} \sim \frac{t}{\Delta\Theta}$$

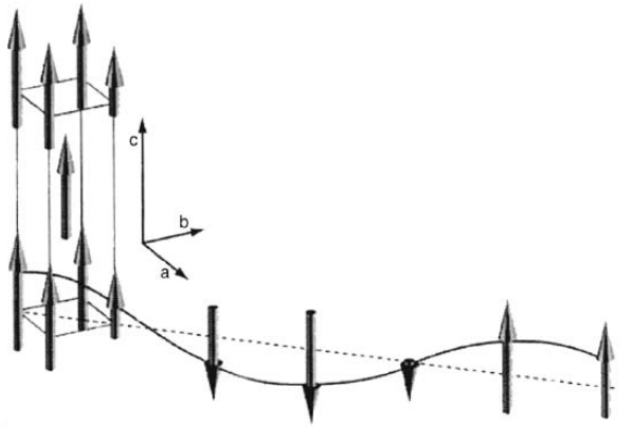
Variable linear polarization between 3.2 – 12 keV

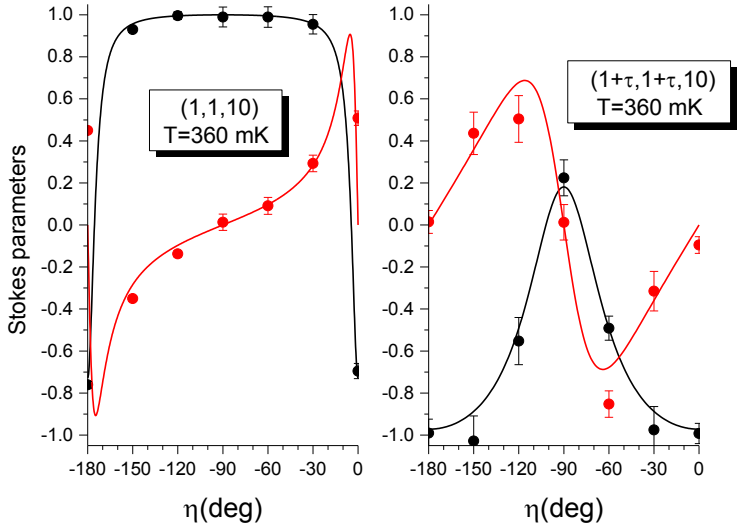
P09: example of outputs





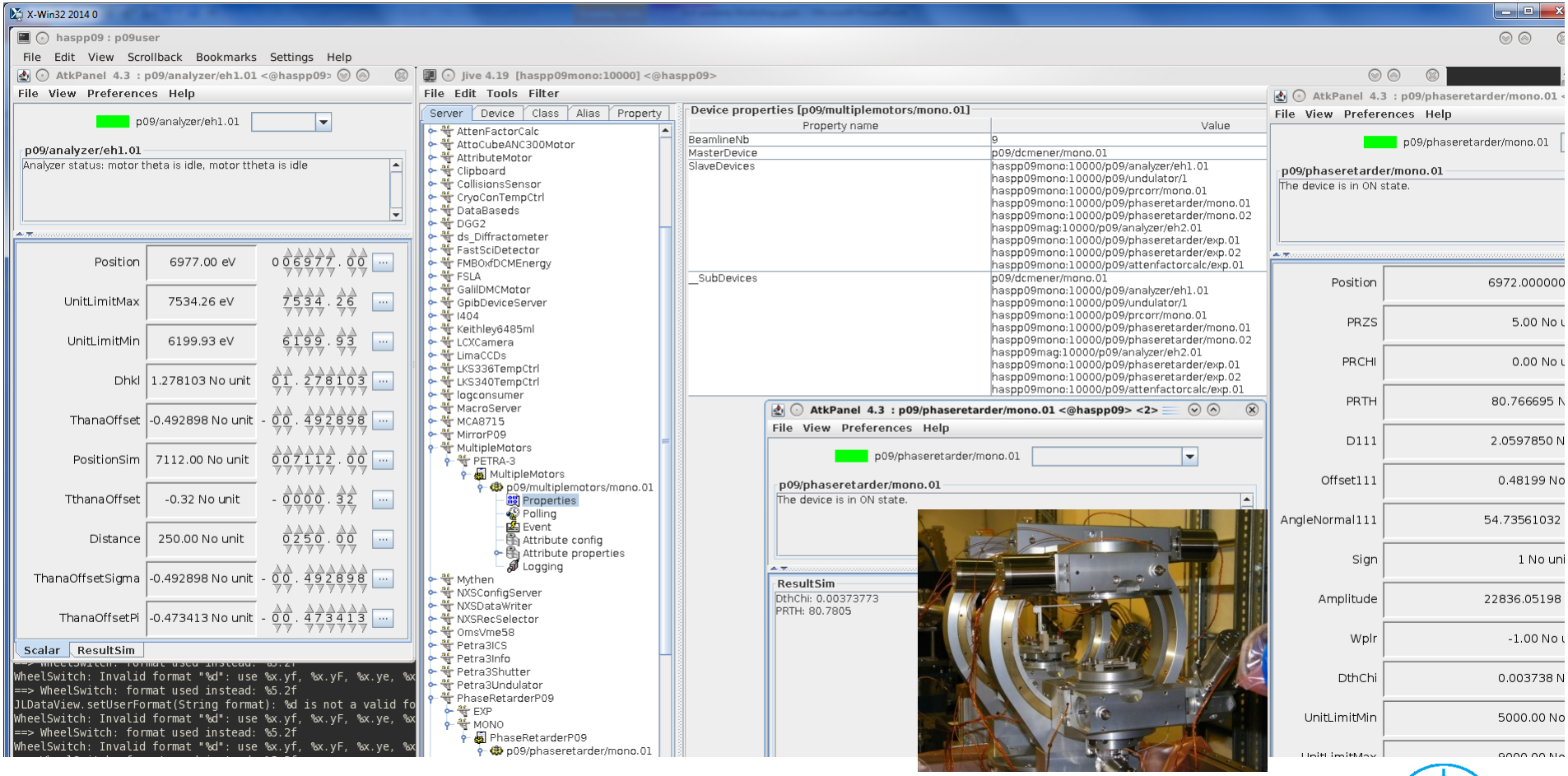






P09 : Experimental Control: Tango

- Tango servers for all devices (motors, counters, mirrors, monochromator, temperature controllers, magnet, phase retarder, ….)



P09 : Experimental Control: several Tango database

- Two hutches : same motor names in the different hutches: two six-circles diffractometer (theta, del, gamma, mu, chi, phi, diff_height, diff_pitch, diff_x): *a problem for spock, two motors can not have same name in the pool* => split Tango database (3 beamline computers , 3 Tango data base, 3 separate spock sessions)

- Specify the hostname for every device in the online.xml file (allows it to have devices from one hutch used in the spock session of another hutch)
  - haspp09 : optics hutch + EH1
  - haspp09mag : EH2
  - haspp09dif : simulations

```
<device>
 <name>s5dx</name>
 <type>type_tango</type>
 <module>motor_tango</module>
 <device>p09/vmexecutor/dif.02</device>
 <control>tango</control>
 <hostname>haspp09dif:10000</hostname>
</device>
<device>
 <name>qbpm1_position_x</name>
 <type>counter</type>
 <module>tangoattributectctrl</module>
 <device>p09/i404/mono.01</device>
 <control>tango</control>
 <hostname>haspp09mono:10000</hostname>
</device>
<device>
 <name>mag_c01</name>
 <type>counter</type>
 <module>sis3820</module>
 <device>p09/counter/mag.01</device>
 <control>tango</control>
 <hostname>haspp09mag:10000</hostname>
</device>
```

P09 : Experimental Control: online.xml file

- Define all devices (motors, virtual motors, diffractometer controller, counters,) in the online.xml file
- Example : motors / virtual motors / diffractometer controller :

```
<!-- motors -->
<device>
 <name>del</name>
 <type>stepping_motor</type>
 <module>oms58</module>
 <device>p09/motor/dif.13</device>
 <control>tango</control>
 <hostname>haspp09dif:10000</hostname>
</device>
<!-- virtual motor -->
<device>
 <name>ptth</name>
 <type>type_tango</type>
 <module>motor_tango</module>
 <device>p09/vmexecutor/dif.08</device>
 <control>tango</control>
 <hostname>haspp09dif:10000</hostname>
</device>
<!-- diffractometer controller -->
<device>
  <name>e6cctrl</name>
  <hkl>mu = motor/diffracmu_mag/1, omega = 4, chi = 5, phi = 6, delta = 13, gamma = 14, crystal = /home/p09user/
crystals/defaultcrystal.txt, energydevice=haspp09mono:10000/p09/multiplemotors/mono.01</hkl>
  <module>PETRA3 P09 EH2</module>
  <type>diffractometercontroller</type>
  <device>haspp09dif:10000/p09/motor/dif.04</device>
  <control>tango</control>
  <hostname>haspp09mag:10000</hostname>
</device>
```

- Stop / restart Sardana when changes in the online.xml file or new library to be taken into account: SardanaAIO.py –x

P09 : Experimental Control: online.xml file

- Define all Tango attributes that we want to have in the headers of the scans or as outputs of the scans as virtual counters in the online.xml file

```
<!-- example of virtual counters, motor positions -->
<device>
 <name>del_position</name>
 <type>counter</type>
 <module>tangoattributectctrl</module>
 <device>p09/motor/dif.13</device>
 <control>tango</control>
 <hostname>haspp09dif:10000</hostname>
</device>
<!-- example of virtual counters, diffractometer position in reciprocal space -->
<device>
 <name>h_position</name>
 <type>counter</type>
 <module>tangoattributectctrl</module>
 <device>pm/e6cctrl/1</device>
 <control>tango</control>
 <hostname>haspp09mag:10000</hostname>
</device>
<!-- example of virtual counter, 14T magnet -->
<device>
 <name>magnet14tf_tempheatexchanger</name>
 <type>counter</type>
 <module>tangoattributectctrl</module>
 <device>p09/magnet/exp.01</device>
 <control>tango</control>
 <hostname>haspp09mag:10000</hostname>
</device>
<!-- example of virtual counter, virtual executor -->
<device>
 <name>sumvfcs_counts</name>
 <type>counter</type>
 <module>counter_tango</module>
 <device>p09/vcexecutor/exp.02</device>
 <control>tango</control>
 <hostname>haspp09mono:10000</hostname>
</device>
```

P09 : Experimental Control: online.xml file

- Define all measurement groups in the online.xml file
- Define which variables to be plotted by the SardanaMonitor (ExpConf mostly used to change headers (new variable))

```
<device>
 <name>mg_magpilatus</name>
 <mgs>timers = exp_t01, mag_t01, counters=mag_c01 -d, pilatus_roi1 -d, pilatus_roi2 -d, pilatus_roi3 -d,
pilatus_imaxx -d, pilatus_imaxy -d, mag_vfc01 -d, exp_vfc01 -nd, petra_beamcurrent -nd, abseh2_position -nd,
abseh2_attenfactor -nd, roi1timesattenfactoreh2 -d, roi2timesattenfactoreh2 -d, h_position -nd, k_position -nd,
l_position -nd, del_position -nd, th_position -nd, ga_position -nd, mu_position -nd, chi_position -nd,
phi_position -nd</mgs>
 <type>measurement_group</type>
 <module>None</module>
 <device>None</device>
 <control>tango</control>
 <hostname>haspp09mag:10000</hostname>
</device>
<device>
 <name>mg_xmcd</name>
 <mgs>timers = exp_t01, mag_t01, counters=exp_vfc01, exp_vfc02, exp_vfc03, sumvfcs_counts, petra_beamcurrent,
dac_voltage, pr1th_position, pr1chi_position, pr2th_position,  pr2chi_position, tga_channel, tga_frequency,
tga_amplitude, xmcd_mirrordelay1, xmcd_mirrordelay2, xmcd_i0plus1, xmcd_i0plus2, xmcd_i0minus1, xmcd_i0minus2,
xmcd_i0plus, xmcd_itplus, xmcd_iplus, xmcd_i0minus, xmcd_itminus, xmcd_iminus, xmcd_intensity, xmcdxas_counts,
xmcddiff_counts </mgs>
 <type>measurement_group</type>
 <module>None</module>
 <device>None</device>
 <control>tango</control>
 <hostname>haspp09mag:10000</hostname>
</device>
<device>
 <name>mg_he3</name>
 <mgs>timers = exp_t01, mag_t01, counters=mag_c01 -d, mag_vfc01 -nd, mag_vfc02 -nd, exp_vfc01 -d, exp_vfc02 -nd,
sumvfcs_counts -nd, petra_beamcurrent -nd, abseh2_position -nd, abseh2_attenfactor -nd, h_position -nd,
k_position -nd, l_position -nd, magnet14tf_persistentfieldt -nd, magnet14tf_correctedprobe -d,
magnet14tf_tempprobe -d, magnet14tf_mainsorb -nd, magnet14tf_minisorb -nd, magnet14tf_tempheatexchanger -nd</mgs>
 <type>measurement_group</type>
```

P09 : Experimental Control: spock

```
p09/door/haspp09mag.01 [4]: setmg
[0] mg_he3
[1] mg_magapd
[2] mg_magpilatus
[3] mg_nurvfcs
[4] mg_xmcd

Your choice [0]? 1

Active measurement group: mg_magapd

p09/door/haspp09mag.01 [5]: anasetup
6.97199843767 1.77831652013

List of polarization analyzers available at P09:
 (1) Al100
 (2) Al110
 (3) Al111
 (4) Al203100
 (5) Au111
 (6) Cu100
 (7) Cu110
 (8) Cu111
 (9) Dy001
 (10) Ge100
 (11) Ge110
 (12) Ge111
 (13) LiF100
 (14) LiF110
 (15) MgO110
 (16) MgO111
 (17) Mo100
 (18) Pd110
 (19) Pt100
 (20) Pt110
 (21) PG001
 (22) Si100
 (23) Si110
 (24) Si111
 (25) TbMnO3020
 (100) Analyser is not listed

Which polarization analyzer are you using ? 7

Cu (2,2,0): [6.241,7.605] keV
The calculated centered position for pth is: 44.08.
43.5 44.0819196321

Did you center the analyzer (y/n) ? n
Align the analyzer and come back to this menu !
```

- Spock : interface between user support and Tango servers for setting up experiment
- Online commands only (no click in jive, minimize number of opened windows / ATK panels) → Sardana Macros & interactive mode (iMacro)

```
p09/door/haspp09mag.01 [13]: mirror_drive 2.65 1
Configuration 1 (Focus in EH1 (2.65 mrad, 11.5 keV)& EH2 (2.13 mrad, 1
Mirror offset: 10.95
M1x: 39.101
M2x: 39.25
M1y: -3.64
M2y: -3.34715
M1pitch: 1.7675
M2pitch: 1.7225
EH1, diaz:          10.94715
EH1, table_height: 10.94715
EH2, table_height:  10.94715
EH2, graz:  10.94715
EH2, diff_height:  10.94715

Beamline components will be moved now to the above positions
and reset the attribute DiffHeightFlat from 10.94715 to 10.94715
Do you really want to proceed (y/n) [n]?

p09/door/haspp09mag.01 [14]: eslave
Possibilities:  no slave device (0)
                undulator       (2)
                prcorr          (4)
                PR1             (8)
                PR2            (16)
                analyzer EH2   (32)
                PR3            (64)
                PR4           (128)
                attenfactor   (256)

New setting [34]?
```

P09 : Experimental Control: spock

- Spock : scripting of macros by beamline staff and fs-ec group (Teresa)
- Different levels of scripting : communication to Tango servers *(set_temp, mirror_drive)* read/write only to more complicated computing (anasetup, virtual executors and motors,…)

```
925 class peak(Macro):
926     """
927          move to center of scan
928     """
929 
930     param_def = [
931         ]
932 
933 
934     def run( self):
935         self.mvsa("peak",0)
936 
937 class set335_xmcd(Macro):
938     """
939          set335_xmcd
940     """
941 
942     param_def = [
943         ['setpoint', Type.String, "", 'Setpoint']
944         ]
945 
946     interactive=True
947 
948     def run( self,setpoint):
949         if setpoint != -999:
950             self.lk335 = PyTango.DeviceProxy("haspp09mag:10000/p09/gpib/mag.14")
951             setp="SETP 1 "+setpoint
952             self.output("setpoint = %s K" % setpoint)
953             self.lk335.GPIBWrite(setp)
954 
955         else:
956             self.output( "Usage: set335_xmcd setpoint")
```

P09 : Experimental Control: spock

- Spock : scripting of macros by beamline staff and ec group (Teresa)
- Different levels of scripting : communication to Tango servers (set_temp, mirror_drive) read/write only to more complicated calculations (anasetup)

```
p09/door/haspp09mag.01 [5]: anasetup
6.97199843767 1.77831652013

List of polarization analyzers available at P09:
 (1) Al100
 (2) Al110
 (3) Al111
 (4) Al2O3100
 (5) Au111
 (6) Cu100
 (7) Cu110
 (8) Cu111
 (9) Dy001
 (10) Ge100
 (11) Ge110
 (12) Ge111
 (13) LiF100
 (14) LiF110
 (15) MgO110
 (16) MgO111
 (17) Mo100
 (18) Pd110
 (19) Pt100
 (20) Pt110
 (21) PG001
 (22) Si100
 (23) Si110
 (24) Si111
 (25) TbMnO3020
 (100) Analyser is not listed

Which polarization analyzer are you using ? 7

Cu (2,2,0): [6.241,7.605] keV
The calculated centered position for pth is: 44.08.
43.5 44.0819196321

Did you center the analyzer (y/n) ? n
Align the analyzer and come back to this menu !
```

```
86              spacegroupnumber=float(SPLIT[11])
87              special=SPLIT[12]
88              IN_TABLE.close()
89
90              #Define here a function that calculates and returns the lattice spacing for th
91              def calcdhkl(h, k, l):
92                      if symmetry == "cub":
93                              dhkl2inv = (h*h+k*k+l*l)/(a*a)
94                      elif symmetry == "tet":
95                              dhkl2inv = (h*h+k*k)/(a*a)+(l*l)/(c*c)
96                      elif symmetry == "ort":
97                              dhkl2inv = (h*h)/(a*a)+(k*k)/(b*b)+(l*l)/(c*c)
98                      elif symmetry == "rho":
99                              n = ((h*h+k*k+l*l)*pow(math.sin(alpha),2.0)+2.0*(h*k+k*l+h*l)*(
100                             d = a*a*(1.0-3.0*pow(math.cos(alpha),2.0)+2.0*pow(math.cos(alpha
101                             dhkl2inv = n/d
102                     elif symmetry == "hex":
103                             dhkl2inv = (4.0/3.0)*(h*h+h*k+k*k)/(a*a)+(l*l)/(c*c)
104                     elif symmetry == "monoclinic":
105                             dhkl2inv = ((h*h)/(a*a)+(k*k*pow(math.sin(beta),2.0))/(b*b)+(l*
    in(beta),2.0))
106                     elif symmetry == "triclinic":
107                             V=a*b*c*math.sqrt((1.0-pow(math.cos(alpha),2.0)-pow(math.cos(be
    )*math(cos(beta))*math.cos(gamma)))
108                             n1=pow(h*b*c*math.sin(alpha),2)+pow(k*a*c*math.sin(beta),2)+pow
109                             n2=2*h*k*a*b*c*c*(math.cos(alpha)*math.cos(beta)-math.cos(gamma
110                             n3=2*k*l*a*a*b*c*(math.cos(beta)*math.cos(gamma)-math.cos(alpha
111                             n4=2*h*l*a*b*b*c*(math.cos(alpha)*math.cos(gamma)-math.cos(beta
112                             dhkl2inv=(n1+n2+n3+n4)/(pow(V,2.0))
113                     else:
114                             self.error("Lattice system not specified for this analyzer. Che
    exiting")
115                             return
116                     dhkl = 1.0 / math.sqrt(dhkl2inv)
117                     return dhkl
118             dhkl=calcdhkl(hh,kk,ll)
```

P09 : Experimental Control: spock

- Spock : interface between users and their experiment
- Spec-like macros : *(or0, or1, br, wh, set_temp, drive_field*,…), ….
- Users have usually only a few of those commands to learn to manage their experiments
- Typical scans: scans of diffractometer angles (*dscan del -0.3 0.3 30 0.5, lscan 0.4 0.6 100 5*) and energy (*escan 6952 7952 100 1 fixq*)
- Scan analysis primordial ! After scan, send scanned device to position of maximum intensity in the scan, or center of mass, or position of dip, …. :
  - command mvsa in spock
  - Environment variable : SignalCounter

P09 : Experimental Control: spock (scan analysis)

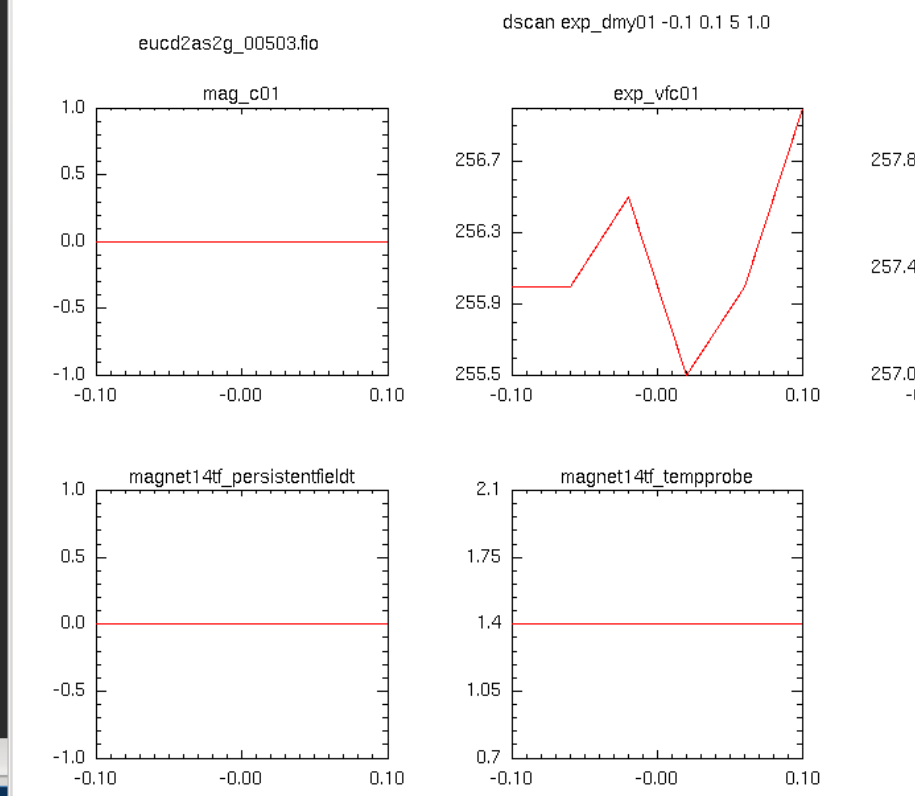
haspp09 : p09user

File Edit View Scrollback Bookmarks Settings Help

```
               DiffracDevice                                controller/diffrac6c/e6cctrl
             FlagDisplayAll                                                       False
  FlagFioWriteMotorPositions                                                        True
     FlagWriteMotorPositions                                                        True
FlagWriteSpecMotorPositions                                                         True
          image_StorageDir                  /gpfs/current/raw/eucd2as2g_00388_pilatus
               JsonRecorder                                                        True
               LogMacroMode                                                           0
              LogMacroOnOff                                                        True
               LogMacroPath                                          /gpfs/current/raw
               PetraCurrent                                                     Counts
                PetraDevice                  haspp09mono:10000/p09/vfc/exp.01
            PilatusSettings                                             [100, 2, 2]
                  PosFormat                                                         3
            PreScanSnapshot  [('haspp09mag:10000/motor/tm_absbox_mag/1', 'abs'), (' [...]
                       Q_hh                                          0.00657626989033
                       Q_kk                                         -0.00189544246503
                       Q_ll                                           7.00408816395
                    ScanDir                                          /gpfs/current/raw
                   ScanFile                        ['eucd2as2g.fio', 'eucd2as2g.spc']
                ScanHistory  [{'title': 'dscan pth -0.3 0.3 30 0.1', 'estimatedtime [...]
                     ScanID                                                       503
              SignalCounter                                                 mag_c01
                 ssa_reason                                                       3
                 ssa_status                                                       0

p09/door/haspp09mag.01 [5]:

p09/door/haspp09mag.01 [5]: mvsa
mvsa.run: file /gpfs/current/raw/eucd2as2g_00503.fio
mvsa: failed to find the maximum for /gpfs/current/raw/eucd2as2g_00503.fio
mvsa: reason 0.0
               Result [5]: 'status=False'

p09/door/haspp09mag.01 [6]:
```

haspp09 : p09user

Spectra-Graphic



Spectra-Graphic | haspp09 : p09user | SardanaMonitor

P09 : Experimental Control: spock

- Typical macros imply loops: pol-scan, T-dep, … (templates adapted by users to their needs)

```
class tdep(iMacro):
     def run(self):
          self.dscan("zs",-1.5,1.5,20,3)
          self.dscan("sperp",-1.2,1.2,20,3)
          for tt in np.arange(2.5,8.1,0.5):
             self.execMacro("set_temp_vti",tt)
             self.execMacro("wait",300)
             self.execMacro("gosigma")
             self.execMacro("ubr",0.00070 ,  0.00030 ,  4.50250 )
             self.dscan("th", -0.5,0.5,50,3)
             self.dscan("ga", -0.4,0.4,40,3)
             self.ascan("e6cctrl_l",4.45,4.55,60,3)
             self.execMacro("ubr",0.00070 ,  0.00030 ,  4.50250 )
             self.execMacro("gopi")
             self.ascan("e6cctrl_l",4.45,4.55,60,3)
             self.execMacro("ubr",0.00070 ,  0.00030 ,  4.50250)
          self.execMacro("gosigma")
          self.dscan("zs",-1.5,1.5,20,3)
          self.dscan("sperp",-1.2,1.2,20,3)
          self.execMacro("set_temp_vti",2)

class polanalysis(iMacro):
     def run(self):
         for mypeta in range(30,-121,-15):
                self.umv("peta",mypeta)
                self.dscan("pth",-0.3,0.3,30,0.5)
                self.cen()
                self.dscan("ptth",-1,1,20,0.5)
                self.cen()
                self.dscan("pth",-0.3,0.3,30,0.5)
                self.cen()

class moveinplates(iMacro):
     def run(self):
```

P09 : Experimental Control: spock (general hooks)

- In the case of beam loss, check for value of petra3 current at every point of the scan and wait that beam is back (wait_for_petra macro); needed for all scans → general hook functions + start_up file

haspp09 : p09user

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```
[1] 4781
p09user@haspp09mag:~/sardanaMacros/generalFunctions$ cd
p09user@haspp09mag:~$ spock
MainThread     INFO     2015-10-05 23:14:43,310 TaurusRootLogger: Using "Py
Spock 1.6.1 -- An interactive laboratory application.

help       -> Spock's help system.
object?    -> Details about 'object'. ?object also works, ?? prints more.

IPython profile: spockdoor

Connected to p09/door/haspp09mag.01
/usr/lib/pymodules/python2.7/matplotlib/__init__.py:923: UserWarning:  This
because the the backend has already been chosen;
matplotlib.use() must be called *before* pylab, matplotlib.pyplot,
or matplotlib.backends is imported for the first time.

  if warn: warnings.warn(_use_error_msg)

Welcome to pylab, a matplotlib-based Python environment [backend: Qt4Agg].
For more information, type 'help(pylab)'.
Activating auto-logging. Current session state plus future input saved.
Filename       : ipython_log.py
Mode           : rotate
Output logging : True
Raw input log  : True
Timestamping   : True
State          : active
enable general hooks feature
enable general on_stop feature
use 'sm' to launch the SardanaMonitor
use 'iv' to launch the SardanaInfoViewer
use 'smm' to launch the SardanaMotorMonitor

p09/door/haspp09mag.01 [1]:
```

haspp09 : p09user

*general_functions.py (~/sardanaMacros/generalFunctions) - gedit <@haspp09mag>

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*general_functions.py

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

file name: $HOME/sardanaMacros/generalFunctions/general_functions.py

The general hooks and condition function.

"""

import PyTango
import HasyUtils

#
#---
#
# the hooks
#
def gh_pre_scan(pmacro):
    pmacro.execMacro('fsopen')

def gh_pre_move(pmacro):
    pmacro.execMacro('wait_for_petra')

def gh_post_move(pmacro):
    pass

def gh_pre_acq(pmacro):
    pass

def gh_post_acq(pmacro):
    pass
```

Feedback from scientists at PETRA III: what we like

- spock: python-base programming language (friendly as compared to spec, perl or gra *but for the indent*)
- Measurement groups very easy to manage (w/ or w/o expconf)
- Environment variables
- Scan analysis (desy)
- General hooks (desy)
- Diffractometer controllers (desy, p09)

Feedback from scientists at PETRA III: what we don't like

- Frequent restarts of macroserver
- Time outs (P08): "try" "except" otherwise macro interrupted and one full night of measurements lost; time-out occurs at one point of the scan, next point should be recorded (set error off);
- Scripting of macros unfriendly to users : self.execMacro ?? Users want to type in their macros file what they type in the online command interface; command *"runseq"* insufficient: does not allow for loops for instance
- In the case of complicated unworking scripts, very difficult to work it out / debug during the experiment itself
- Scan viewer: miss a cursor
- Scan speed : can it be optimized ? Slower if too many variables read ? Counters read all at the same time or one after the other ?
- 2D Detectors : fast data rate a problem (P10)

Feedback from scientists at PETRA III : room for improvement

- Not all environment variables should be visible to the users
- Users macros should be in another folder than the sardanaMacro folder
- Macros:
  - If one error is in the macro, all macros of a library are not loaded
  - If one error is in the macro (relmaclib does not work, you have to take addmaclib)
  - It is not possible to give a variable from one macro to the other within a library (only if one save them as environmental variable)
- Error messages not understandable:
  - Not understandable or sometimes even no messages and the macro is not loaded
  - CORBAtimeout – one cannot see which device courses the trouble
  - “motion ended in FAULT” – one cannot see which motor and all motors are in "normal" state afterwards
- Data Analysis and Visualization (SciPy ?)

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