User Manual 2

for

BL-18 B (Indian Beam line) at Photon Factory

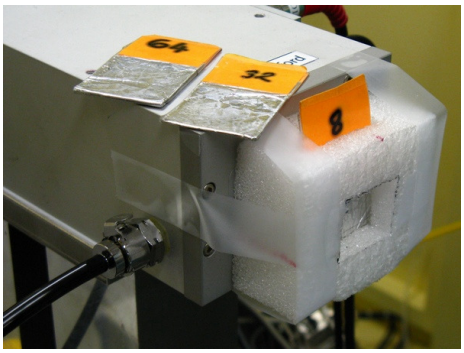
Alignment of the 2nd Goniometer

Instructions for the users

Never allow the direct beam without proper absorber to fall on any type of detector.

Absorbers currently in use

64 - (64 x 20 micron Al foil)
32 - (32 x 20 micron Al foil)
16 - (16 x 20 micron Al foil)
8 - (8 x 20 micron Al foil)



Motors used in the liquid spectrometer:

All the goniometers at BL-18B are configured according to the right handed Cartesian co-ordinate system, where + y-axis represents the incoming beam direction.

*For changing incident energy, please refer **User Manual-1**.*

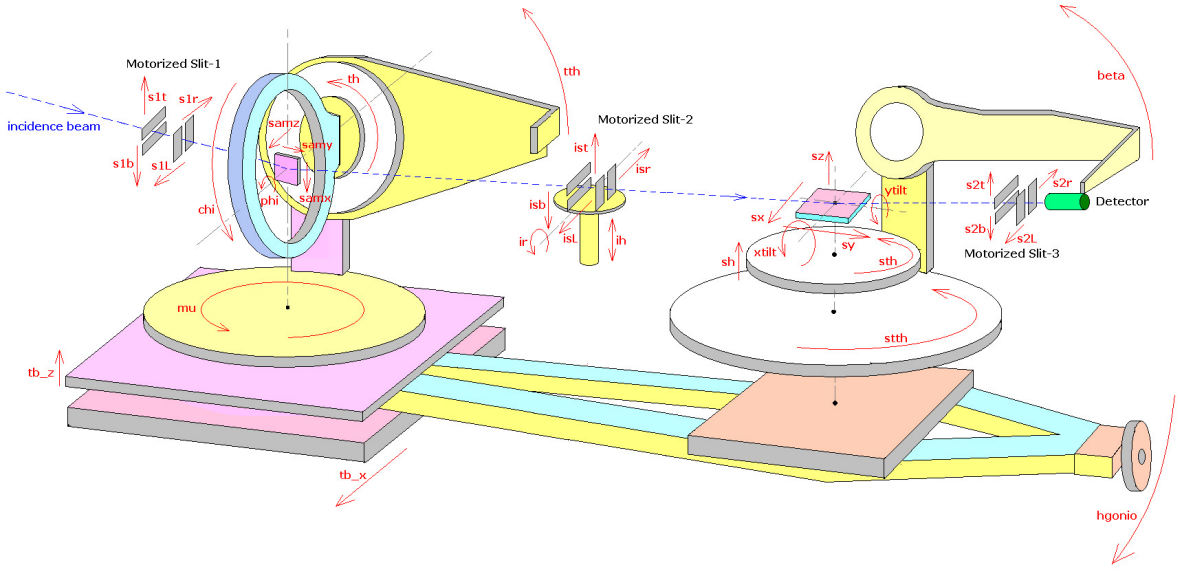
1st Goniometer motors

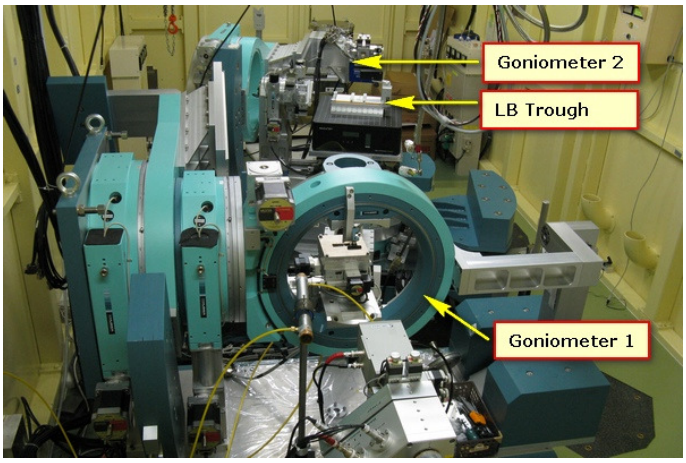
(Steering of Ge-crystal, will be mounted over this goniometer)

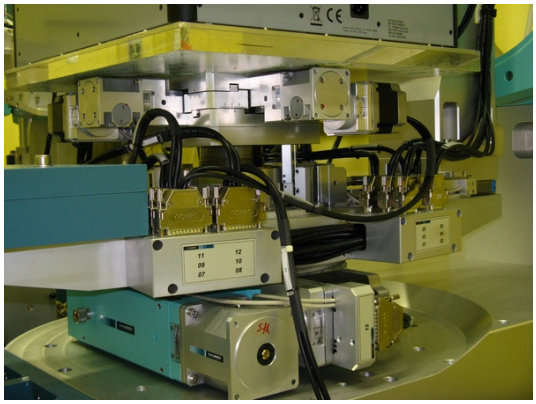
filt -	Filter before the ion chamber.
th –	Crystal rotation around the x-axis.
tth –	Detector rotation around the x-axis.
alf –	Crystal rotation around the beam direction, about y-axis, normally 'chi' in fourc.
phi –	Crystal in-plane rotation, rotation in the goniometer axis.
mu –	Whole goniometer rotation about the goniometer axis.
s1slit –	all the motors of slit-1 (primary beam slit, including the pseudo-motors for gap and center of the slits).
s2slit –	all the motors of slit-2 (diffracted beam slit, including the pseudo-motors for gap and center of the slits).
tbx –	Goniometer x-motion motor.
tbz –	Goniometer z-motion motor.
samx –	Sample x-motion motor.
samy –	Sample y-motion motor.
samz –	Sample z-motion motor.
bm_h –	Beam monitor horizontal.
bm_v –	Beam monitor vertical.

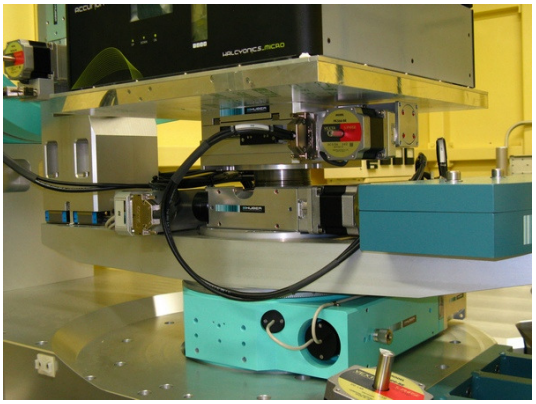
2nd Goniometer motors
(Sample will be mounted over this goniometer)

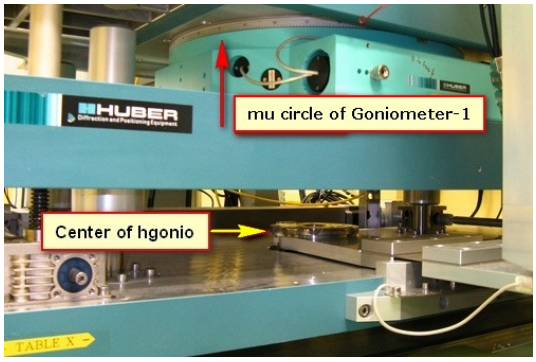
sh –	Whole goniometer height motion motor.
sx –	Sample x-motion motor.
sy –	Sample y-motion motor.
sz –	Sample z-motion motor (for fine tuning, this motor is sensitive to the load on the sample stage).
sth –	Sample in-plane motion around the z-axis.
beta –	Detector rotation around x-axis.
stth –	Detector in-plane rotation around the z-axis.
xtilt –	Sample tilt around x-axis.
ytilit –	Sample tilt around y-axis.
ih –	height of flight path.
ir –	flight path rotation around x-axis.
ome –	Vertical sample stage horizontal motion.
hgonio –	Air pad motion for total goniometer motion.
is –	slit assembly between the diffractometers (horizontal slit was connected).

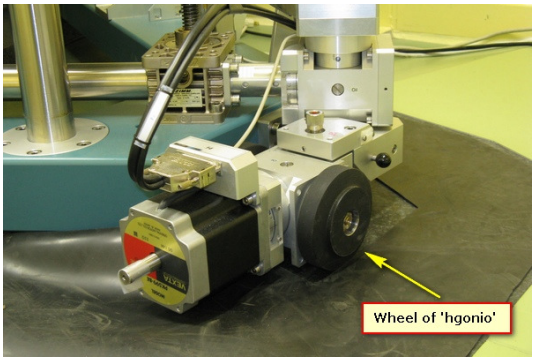


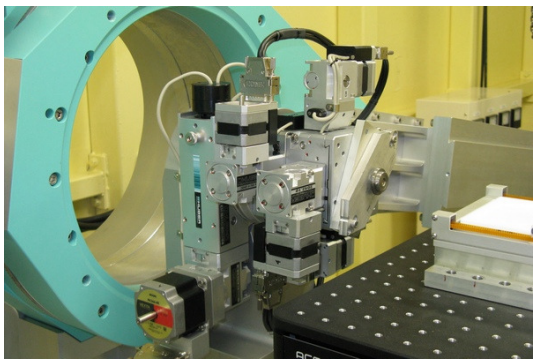

Goniometer 2
LB Trough
Goniometer 1

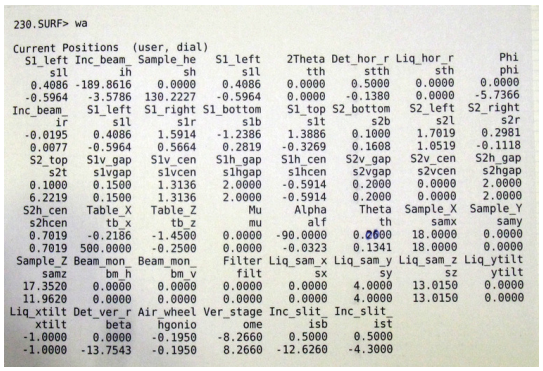





HUBER
mu circle of Goniometer-1
Center of hgonio


Wheel of 'hgonio'





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230.SURF> wa

Current Positions  (user, dial)
  S1_left Inc_beam_ Sample_he   S1_left    2Theta Det_hor_r Liq_hor_r       Phi
      s1l       ih        sh       s1l       tth      stth      sth       phi
   0.4086 -189.8616    0.0000    0.4086    0.0000    0.5000    0.0000    0.0000
  -0.5964   -3.5786  130.2227   -0.5964    0.0000   -0.1380    0.0000   -5.7366
Inc_beam_  S1_left S1_right S1_bottom   S1_top S2_bottom  S2_left  S2_right
       ir      s1l      s1r      s1b      s1t      s2b      s2l      s2r
  -0.0195   0.4086   1.5914  -1.2386   1.3886   0.1000   1.7019   0.2981
   0.0077  -0.5964   0.5664   0.2819  -0.3269   0.1608   1.0519  -0.1118
  S2_top  S1v_gap  S1v_cen  S1h_gap  S1h_cen  S2v_gap  S2v_cen  S2h_gap
      s2t    s1vgap    s1vcen    s1hgap    s1hcen    s2vgap    s2vcen    s2hgap
   0.1000    0.1500    1.3136    2.0000   -0.5914    0.2000    0.0000    2.0000
   6.2219    0.1500    1.3136    2.0000   -0.5914    0.2000    0.0000    2.0000
  S2h_cen  Table_X  Table_Z        Mu     Alpha     Theta  Sample_X  Sample_Y
   s2hcen      tb_x      tb_z        mu       alf        th      samx      samy
   0.7019   -0.2186   -1.4500    0.0000  -90.0000    0.2600   18.0000    0.0000
   0.7019  500.0000   -0.2500    0.0000   -0.0323    0.1341   18.0000    0.0000
Sample_Z Beam_mon_ Beam_mon_    Filter Liq_sam_x Liq_sam_y Liq_sam_z Liq_ytilt
    samz      bm_h      bm_v      filt       sx       sy       sz     ytilt
  17.3520    0.0000    0.0000    0.0000   0.0000   4.0000  13.0150   0.0000
  11.9620    0.0000    0.0000    0.0000   0.0000   4.0000  13.0150   0.0000
Liq_xtilt Det_ver_r Air_wheel Ver_stage Inc_slit_ Inc_slit_
    xtilt     beta    hgonio       ome      isb      ist
  -1.0000   0.0000  -0.1950   -8.2660   0.5000   0.5000
  -1.0000 -13.7543  -0.1950    8.2660  -12.6260  -4.3000
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Use "*surf*" for this alignment.

To align the 1st goniometer, w.r.t direct beam, please refer user manual-1.

Mount the Ge(111) crystal and find the diffraction beam (keeping absorbers ~ 12° 2-theta for 18keV energy) and do the fine adjustment using '*th*, *tth*, *alf*, and *phi*' ('*lup*' command).

Move *alf* (*chi*) 90° and shift the detector from 1st goniometer to second goniometer.

Keep the 2theta arm at 90° so that it will not come in the path of 2nd goniometer.

Focus the detector to the center of the 2nd goniometer.

'*samz*' of the 1st goniometer should be moved down so that the sample is out of the direct beam in order to align the 2nd goniometer.

There are two pins on the 2nd goniometer one is on the vertical sample mounting stage and other is on the normal (horizontal) sample mount. Use "*ome*" command to bring vertical stage of the 2nd goniometer to the goniometer center and adjust height of the pin on the horizontal sample stage such that it comes in the direct beam then align the goniometer to the direct beam.

Adjust the height of the 2nd goniometer such that the direct beam passes through the detector and cutting the pin at the center of the goniometer (use all the absorbers).

Move '*samz*' to the original position (half cut) and '*mu*' to » 6° (in case of E = 18 keV) for diffraction peak. Use florescent screen to view the diffracted beam and fine tune '*mu*'.

Slowly move the 2nd goniometer to the diffraction peak using the air pad motor ('*hgonio*') and the florescent screen.

After finding the diffracted beam fine tune '*mu, phi* and *alf*' to get maximum intensity. Then align the 2nd goniometer to the diffracted beam.

For aligning the 2nd goniometer to the diffracted beam, fine tune '*alf*' and '*beta*' while reducing the detector slits and align '*stth*' as well to the direct beam.

Keep the flight path, ion chamber and the slit assembly (manual and motor controlled) between the two goniometers and adjust to the diffracted beam.