

## **VLS-PGM Manual**

Start the "PGM Control Panel" by double clicking on the icon:



On the left hand-side of the panel there are:

- **1** The switches of the High Voltages apply to the Branch A. Here you turn ON/OFF the HV FL before & after a scan (see Sample Loading Procedure on page 22) when the Absorption Chamber is on Branch A.
- 2 The switches of the High Voltages apply to the Branch B. Here you turn ON/OFF the HV FL before & after a scan (see Sample Loading Procedure) when the Absorption Chamber is on Branch B.
- Active Branch-line Selection (A or B).Before start the run make sure the right Branch-line is selected.
- 4 The state (Closed/Open) of the Photon Shutters along the beamline. (From here you can actually OPEN and CLOSE the Shutter two (PSH-2) and the PGM Shutter three (PSH.3-I20-01) without the use of the Panels "PGM frontend" and "PGM beamline" on page 11).
- The state (Closed/Open) of the End-Station gate valve, for both branches.
   (From here you can actually OPEN and CLOSE the Gate valves VVR.4-I21-04 and VVR.1611-4-I22-04 without the use of the Panel "PGM beamline" on page 11).

In the central part of the panel there are:

- 6 Energy Selection in eV, and related feedback. Once you start a scan the "User Data Acquisition Program" automatically sets this energy to the requested value.
- 7 Emergency Stop Button; it stops any moving motor in the "PGM Control Panel"
- **8** Grating Selection (High; Medium; Low). Before start the run make sure you are working with the right grating.
- **9** SLIT WIDTH selections in  $\mu$ m (5-250  $\mu$ m). The Entrance Slit (common for both branches) and the Exit Slits Branch A or B.

The right hand-side of the panel gives indication about:

**10** The Ring Current and Beam Lifetime

and a general Beamline Overview

gh Voltage: Branch A Positive HV	Energy Valves Beamline	10	Storage Ring SR1 STORED	
vevice Setpoint HV Status Actus	Energy: 200.0000	2 653422 mA	146 521 599	neumo.
	e Feedback: 200.0057 (Moving	1000422 1111	140.021000	
		10ID - DoStr	eam Position Monitors	)#2
	, Emergency Stop	x 648	-260 -44	2
	(ALL Motors)	v: -242	-1055 -21	8
	, Monochromator			
	Energy: 200.0000	В	eamline Overview	
	Encoder Setpoint: 47822290 step	2	Diada Cumanta	
	Encoder Feedback: 1689912 count OMoving	M1 -2.515e-	07 A Exit B Unner	5 103e-09
igh Voltage: Branch B	Velocity: 5000 step/s	M2 -2.730e-	07 A M5	3.908e-14
Positive HV	0-order	Ent S Lower 1 254e-(	17 A M6	1.940e-12
evice Setpoint nv Status Volta	e Grating/M3 Mirror Selection	EnS linner 1 986e-0	TA FLY	2.629e-13
10_BL Bias 80.00 V On 7 On 79.25	High Energy (90.0 - 260.0) / Reset to This	M4 2.956e-1	IDA TEV	4 015e-13
TEY Bias 65.00 V On 7 On 64.00	v fbk: HE M/LE Grating	Exit A Upper 2132e-1	L3 A PD	0.000e+00
10_E Bias 80.00 V On 📝 On 79.25	Δ     Δ	Exit A Lower 6.040e-1	I3 A IO	3.779e-11
Negative HV	Undulator	Exit B Lower 6.229e-0	J9 A Unassigned 16	1.575e-11
FL Detect 1375.00 \ Off / Off 0.25	/ Track Energy: 200.0000	Meters:	e-Read Continuous Dv	vell: 1.000
0.75	/ Gap (mm)			
3 0.00 - 0.00	/ Set Point: 136.8690 mm OAt Gap	lo	n Pump Pressures	
ctive Branchline B / Branch B motor -34766	Current 136.8685 mm	FE1: 5.83e-10 To	orr Mono: 1.30	e-09
	Slit Position	FE2: 8.54e-10 To	orr M4: 2.10	e-09
PSHI: PSH2: SSH1: PGM PSH3	Exit Pos, Branch A:0.000 mm fbk steps: 4600	FE3: 9.79e-10 To	orr ExSlit A: 1.40	e-09
PEN OPEN OPEN OPEN	Exit Pos, Branch B: 0.000 mm fbk steps: 13800	M1: 1.30e-09	M5: 1.80	e-09
Opened 7 Opened		M2: 2.00e-09	ExSlit B: 8.80	e-10
ndstation Gate Valves	4 Slit Width	ST1: 1.80e-09	M6: 7.70	e-10
ranch A Branch B	Entrance Slit 50 000 um thk stens: 4053	ST2: 1.60e-09	EB1: 8.20	e-10
LOSED OPEN	Exit Slit, Branch A 50 000 um fbk stens: 5724	<b>5</b> Slit: 1.70e-09	EB2: 0.00	e+00
losed / Opened	Exit Slit. Branch B: 50 000 um fbk stens: 5724	Premono: 1.30e-09		
you <u>Cancel</u> a selection, you should re-select	and an and a second sec	N/U: 0.00e+00	N/U: 0.00	e+00

To change the grating to the desired range

- 1. Select from the Grating/Mirror Selection box **8** the desired grating.
- 2. Wait till all the three numbers in the white boxes (HE; M/LE and Grating) have stopped! They represent the motor step positions for the optical components inside the monochromator.
- 3. Type in the turquoise box  $\mathbf{6}$  an energy close the value you need for your scan, this will adjust the Undulator to work in the range defined by the grating.

Always remember that this process is TIME CONSUMING ~5 minutes

# Things to do AFTER EVERY INJECTION

After every injection as soon as the control room has enabled the beamline and BEFORE start a new data acquisition you will have to **OPEN** few Photon Shutters.

1. First thing to do is MANUALLY **OPEN** the Safety Photon Shutter (SSH1) by the panel outside the hutch pushing the green button.



User Interface - Planar Grating Monochromator			*
<u>File Edit View Help</u>			
High Voltage: Branch A Positive HV	Energy Valves Beamline	Stor SR1 SR1Current:	age Ring STORED Beam Lifetime:
Device Setpoint HV Status Actual	Energy: 200.0000	12.657009 mA	158.274098
10_BL Bias 80.00 V TEY Bias 65.00 V 007 V 070 000 V	Feedback:200.0057 OMoving	SR Beam I 10ID - DnStr 11ID	Position Monitors #1 11ID #2
	Emergency Stop	x:650 -25	7 -440
Nenative HV	(ALL Motors)	y: -242 -10	-218
0.00 V 0.00 V 0.00 V 0 m 0 m 0 m 0 m 0 m 0 0.00 V	Monochromator Energy:200.0000 Encoder Setpoint 47822290 step	Beamlir	ne Overview
0.00 V Off V Off 0.00 V	Encoder Feedback 1689912 count	Blade	e Currents
High Voltage: Branch B	Velocity 5000 step/s	M1 2.842e-14 A	Exit B Upper 0.000e+00 A
Positive HV	0-order	M2 -1.776e-14 A	M5 3.553e-14 A
Device Setpoint HV Status Actual		Ent S Lower 5.329e-14 A	M6 -8.171e-14 A
on/off Voltage	Grating/M3 Mirror Selection	EnS Upper: 7.105e-14 A	FLY -2.238e-13 A
10_BL Bias 80.00 V On 7 On 79.25 V	High Energy (90.0 - 260.0) / Reset to This	M4 -2.842e-14 A	TEY 7.105e-14 A
1EY Bias 65.00 V On V On 64.00 V	66824 -33000 42806	Exit A Upper 6.040e-14 A	PD 7.105e-15 A
10_E Bias 80.00 V		Exit A Lower 4.263e-14 A	IO -1.776e-14 A
Negative HV	Undulator	Exit B Lower -8.171e-14 A	Unassigned 16 -1.563e-13 A
FL Detect 1375.00 \ Off / Off 0.25 V	Track Energy: 200.0000	Meters: ODone Single-Rea	Continuous Dwell: 1.000 s
0.00 V 01 V 01 0.75 V 0.00 V 01 V 01 01 0.00 V	Gap (mm) Set Point <mark>: 136.8690 mm</mark>	lon Pun	ip Pressures
Active Branchline: B 7 Branch B motor -34766	Current: 136.8685 mm OMoving	FE1: 5.84e-10 Torr	Mono: 1.30e-09
Chullens	Slit Position	FE2: 8.65e-10 Torr	M4: 2.00e-09
PSH1: PSH2: SSH1: PGM PSH3	Exit Pos, Branch A: 0.000 mm fbk steps: 4600	FE3: 9.07e-10 Torr	ExSlit A: 1.40e-09
OPEN CLOSED OPEN CLOSED	Exit Pos, Branch B: 0.000 mm fbk steps: 13800	M1: 1.00e-09	M5: 1.80e-09
Closed 📝 Glosed 📝	)	M2: 1.60e-09	ExSlit B: 8.70e-10
Endetation Gate Values		ST1: 1.60e-09	M6: 7.60e-10
Branch A Branch B	Slit Width	ST2: 1.50e-09	EB1: 8.00e-10
CLOSED	Enuance Site 50,000 um tok steps: 4053	EnSlit: 1.70e-09	EB2: 0.00e+00
Closed / Closed /	Exit Sit, Branch A 50.000 um Tok steps: 5724	Premono: 1.20e-09	-
If you <u>Cancel</u> a selection, you should re-select the currently active one to re-activate the selector	Exit Silt, Branch B <mark>150.000 um</mark> tok steps:15724	N/U: 0.00e+00	N/U: 0.00e+00
<select></select>			11:50:38, Tue, 12 Feb 2008
			1.17

It is possible check the state of the shutter from the PGM control panel – User interface

2. Next, **OPEN** the Shutter two (PSH2)

Active Branchline: B Branch B motor:  -34766			-	
Shutters: PSH1:	PSH2:	SSH1:	PGM PSHJ.	E
OPEN	OPEN OPEN		CLOSED	
	Opened 📝		Closed	/-
Endstation Gate Valves				
Branch A	Branch A Branch B			
CLOSED				

**NB:** this shutter (PSH2) is in COMMON with the SGM beamline.

Closing it could interrupt/jeopardize the SGM Users' experiment!!!

and the Shutter three (PGM-PSH3) from the PGM control panel – User interface.

Active Branch	iline: <mark>B</mark>	ranch B	motor: -34766	_
Shutters:				_
PSH1:	PSH2:	SSH1:	PGM PSH3	E×
OPEN	OPEN	OPEN	OPEN	Þ
	Opened 🏹		Opened 🛛 🗸	ノ
Endstation Gate Valves				
Branch A Branch B				

3. Last, **OPEN** the End-Station gate valve of the Branch-line you are using. The light is now hitting your sample.



#### Solid State Chamber: Sample Loading and Removing Procedure

Removing:

- 1. Make sure **FROM THE PGM CONTROL PANEL** (VLS-PGM Manual pages 1 and 2):
  - the high voltage (-1450 V) on the fluorescence (FL) detector is **OFF** (ramped down and off);

- the End-Station gate valve VVR.4-I21/I22-04 (connecting to the upstream of the beamline) is **CLOSE**.

- 2. Rotate the sample (manipulator)  $180^{\circ}$  cloak wise (CW), sample now facing the transfer rod ( $\theta \sim 290^{\circ}$ ).
- 3. Open the manual gate valve (on the transfer side, downstream) by turning CCW.
- 4. Push the magnetic transfer rod into the main chamber (don't push it too hard, too fast, if it is stiff, pushing and rotating the magnetic spinner), a simple rotation should unlock the sample from the main chamber manipulator; once it is locked onto the transfer holder, gently pulling the transfer rod back to the load-lock area (ideally in one motion, pulling and rotating, to avoid the drop of the sample due to vibration).
- 5. Make sure you see the end of the transfer rod (with the sample <sup>(c)</sup>) from the window of the load-lock section, then close the manual gate valve between the main chamber and the load lock area.
- 6. Turn off the turbo pump of the load-lock section (pushing the start/stop button), vent the load-lock section using the Nitrogen line (green valve), open the door with the view port, unlock the sample from the transfer rod and you are now ready to load another sample.

### Loading:

- 1. With your sample properly mounted on the sample holder and the load-lock section up to the air, load the sample to the transfer rod.
- 2. Close the Nitrogen line, close the door with the view port and start the pump (pushing the start/stop button).
- 3. Wait till the pump reaches the NORMAL OPERATION and the pressure in the load-lock section is better than 6.1 mTorr (i.e. 5.8 mTorr), open the manual gate valve (turning CCW) between the load-lock and the main chamber; the pressure in the main chamber should stay better than 3x10<sup>-6</sup> Torr (i.e. 2.8x10<sup>-6</sup> Torr).
- 4. The sample holder on the main chamber manipulator should be facing the transfer side; a simple rotation on the magnetic spinner should unlock and lock the sample to the manipulator.
- 5. Pull the transfer rod out of the main chamber (gently and in one motion), be sure that you see the end of the transfer rod from the view door.
- 6. Close the manual gate valve (turning CW), and rotate the sample (in the main chamber)  $180^{\circ}$  CCW, facing the beam! ( $\theta \sim 120^{\circ}$ ).
- 7. If the pressure in the main chamber is reasonable (better than  $5 \times 10^{-7}$  Torr; i.e.  $4.8 \times 10^{-7}$  Torr) FROM THE PGM CONTROL PANEL switch **OPEN** the End-Station gate valve VVR.4-I21/I22-04 between the main chamber and the upstream of the beamline and turn **ON** the FL high voltage (-1450 V).

# USERS DATA ACQUISITION

Start the "USERS DATA ACQUISITION" by double clicking on the icon:



File Graphics Help         Control Scan Events Motor Groups         Operation         Start       Pause         Mode: Off         0%         Output         File         Repeat         1       0 of 1         Setup         Header Info ^ Little > Lots         Spectrum File         Format         Binary > Text         Directory Path:         File Name         Next Sequence         Number         Comments         I	✓ Data Acquisition	<b>— — ×</b>
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Operation Start Pause Stop Mode: Off Output File Repeat Repeat O of 1 Setup Header Info  Little  Lots Spectrum File  Binary  Text Directory Path: File Name Next Sequence Number Comments	Control Scan Events Motor Groups	
Start     Pause     Stop       Mode: Off     0%       Output     0%       File     0 of 1       Setup     Peader Info ~ Little ~ Lots       Spectrum File     > Binary ~ Text       Directory Path:     Browse       File Name     Next Sequence       Number     Comments	Operation	A
	Operation       Start       Pause       Stop         Mode: Off       0%       0%         Output       0%       0%         File       0%       0%         Output       0%       0%         Setup       0 of 1       Setup         Header Info <> Little <> Lots       Spectrum File         Format       Binary <> Text         Directory Path:       Browse         File Name       Number         Comments       A	
		17

▼ Data Acquisition	_ <b>-</b> ×
File Graphics Help	
Save fotor Groups	
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Header Info 🐟 Little 🖕 Lots	
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From the "File" menu Load the configuration file "NEW\_Energy\_scan\_USER"

Work your way down the directory tree until you see the configuration file required. this file is in the '/home/pgm/Desktop/USERS directory (folder)

File       Graphics       Help         Control       Scan       Events       Motor Groups         Operation       Image: Create Dir       Delete File       Rename File         Create Dir       Delete File       Rename File         //ome/pgm/Desktop/USERS       Image: Create Dir       Delete File         Re       //       //       Files         //       //       Files       Image: Create Dir         O       Directories       Image: Create Dir       Files         //       //       Files       Image: Create Dir         //       //       //       //       Files         //       //       //       Files       Image: Create Dir         //       //       //       //       Files       Image: Create Dir         //       // <th>♥ Data</th> <th>a Acquisition</th> <th>- 0 X</th>	♥ Data	a Acquisition	- 0 X
Control Scan Events Motor Groups Operation Create Dir Delete File Rename File Create Dir Delete File Rename File //nome/pgm/Desktop/USERS // // Bancroft M/ Different Configurations/ Dong&Blyth/ Dimes/ Next Selection: /home/pgm/Desktop/USERS NEW_Energy_Scan_USERS NEW_Energy_Scan_USERS NEW_Energy_Scan_USERS NEW_Energy_Scan_USERS NEW_Energy_Scan_USERS NEW_Energy_Scan_USERS NEW_Energy_Scan_USERS	File	Graphics Help	
Operation	Contr	ol Scan Events Motor Groups	
Create Dir Delete File   Create Dir Delete File   Re /home/pgm/Desktop/USERS   Directories	[ <sup>Oper</sup>	ation	Ā
Create Dir       Delete File       Rename File         /home/pgm/Desktop/USERS       ////////////////////////////////////		✓ Load Configuration File	
/home/pgm/Desktop/USERS         0         Directories         //         ./         Setur         \$/         ./         Setur         \$/         A Pratt/         A Pratt/         Spect         Aswath/         Bancroft M/         Different Configurations/         Ding&Blyth/         Dunase/         Next         Selection: /home/pgm/Desktop/USERS         New_Energy_Scan_USERS		Create Dir Delete File Rename File	
O       Directories		/home/pgm/Desktop/USERS	
NEW_Energy_Scan_USERS	O Re Setup Fo Direc Next	Directories	
		NEW Energy Scan USERS	
OK Cancel 7		OK Cancel	

In the Scan page make sure you are scanning over the right energetic range, from higher (Start Value) to lower (Final Value) energy, with a negative step (Delta Value).

❤ Data Acquisition				_ = ×
File Graphics Help				
Control Scan Events N	Aotor Groups			
				. Create 1
Scan Name: Energy_Sca	n		A	New Scan
				Delete
🗖 Trigger on	Start?			Scan
PV name	Start Value	Delta Value	Final Value	ANew
BL1611-ID-2:Energy	215	-0.25	207	Delete
BL1611-ID-2:Energy	207	-0.1	190	-
BL1611-ID-2:Energy	190	-0.25	183	
<u> </u>				
Trigger Select			Properties	
A Start		11-	1 Topolitoo	
A Begin Pace				
Duell				
♦ Dwell				
🕹 Finish				
Add New (	Call Event Call Scan	Set PV		
	Wait Event   Wait Scan	Wait PV		
	Wait Motor Delay Time	Set Control		
ading config file /home/ngm/Deskton/USERS/NEW_Energy_Scon_USERS				
Loading config file /nome/pgm/Desktop/USERS/NEW_Energy_Scan_USERS				

You can also scan over several consecutive regions with different steps (delta values). To add a new region click the New button.

To delete a region click the Delete button.

To visualize the data while acquiring, select "Start ROOT Monitor" from the "Graphics" menu

✓ Data Acquisition	<mark>- D ×</mark>
File Graphics Help	
Contro Stop Monitors Oper: Start Grace Monitor	- Loading config file /home/pgm/Desktop/U ₽ 🔼
Start ROOT Monitor Configure se Stop	SERS/NEW_Energy_Scan_USERS
Mode: Off	
0%	
Output File	
Repeat 0 of 1	
Setup	
Header Info 🔶 Little 🐟 Lots	
Spectrum File Format 🗇 Binary 🐟 Text	
Directory Path:sktop/USERS/Julie/June26/ Browse	]
File Name ZDDP_%d.dat	
Next Sequence 13	
Comments	
Loading config file /home/pgm/Desktop/USERS/NEW_	⊐J]7 Energy_Scan_USERS

This window will pop up:

[]	BLGraph	r1
New View	Load Data	Configure
	Quit	

Keep the BLGraph window always open, DO NOT press the "Quit" button. Automatically a new plot will start at the starting of each scan. Next, check the settings in the Control Page (see picture on page 6):

User's data are generally saved in '/home/pgm/Desktop/USERS' under your own directory. The "Directory Path" shows where yours file will go

In the "File Name" the symbol "%d" will give you sequential file numbers for sequential runs. Click "Start" in the Control page of the Data Acquisition when you are ready to scan.

# VLS-PGM PV names

BL1611-ID-2:Energy:fbk	(J	Beamline Energy feedback (eV)
A1611-4-11:nA:fbk	Ē	EndStation Ni mesh Io current (nA)
A1611-4-09:nA:fbk	Ē	TEY (nA)
A1611-4-08:nA:fbk	Ē	FLY (nA)
A1611-4-10:nA:fbk	Ē	Si Photodiode current (nA)
A1611-4-02:nA:fbk	Ē	Branch A Exit Slit Lower Blade current (nA)
A1611-4-03:nA:fbk	Ē	Branch A Exit Slit Upper Blade current (nA)
A1611-4-04:nA:fbk	Ē	Branch B Exit Slit Lower Blade current (nA)
A1611-4-05:nA:fbk	Ē	Branch B Exit Slit Upper Blade current (nA)
A1611-3-03:nA:fbk	Ē	Entrance Slit Lower Blade current (nA)
A1611-3-04:nA:fbk	Ē	Entrance Slit Upper Blade current (nA)
UND1411-02:gap:mm:fbk	Ē	Undulator Gap (mm)
PCT1402-01:mA:fbk	Ē	SR1 current (mA)
SMTR16114I2004:enc:fbk	Ē	Encoder Feedback
BL1611-ID-2:Energy	Ē	Beamline Energy
A1611-4-12:nA:fbk	Ŧ	Beamline Ni mesh Io current (nA)

## **Trouble shutting**

In the RARE event that you are not able to **OPEN** the Shutter two (PSH2), there are a number of things that should be check.

Start the "PGM FRONTEND" and "PGM BEAMLINE" by double clicking on the icons:





"PGM FRONTEND" panel:



Check that the beamline has been **ENABLED** by the control room and that the Safety shutter is opened by the panel outside the hutch. If closed, MANUALLY open the Safety shutters pushing the green button.

From the Computer screen **OPEN** the Shutter two (PSH-2) on the PGM frontend panel.

## "PGM BEAMLINE" panel:



Check that all valves (VVR.\*) are **OPEN** on the PGM frontend and PGM beamline panels. If closed, **OPEN** the Shutter three (PSH.3-I20-01) on the PGM beamline panel.

<u>NB</u>: All the valves (VVR.\*) of the active Branch have to be in the **OPEN** position, to be allowed to open the Shutter three (PSH.3-I20-01).

Keep these two panels open and running on one of the Desktops.

If all the valves (VVR.\*) are **OPEN** but you still cannot **OPEN** the Shutter two (PSH2) start the SGM/PGM flow switches display by double clicking on the icon:



#### **High Voltage Controller**

If the HV controls **1** & **2** on page 2 are not responding (i.e. you try to switch OFF or ON and nothing happen) and the pressure in the end-station chamber is better than  $5 \times 10^{-7}$  Torr; it means the HV control application has locked up. The options are:

- During "office hour" contact Dr Ru Igarashi (office # 2025; phone x 3751)
- Otherwise contact the Floor Coordinator and ask for the CID on call. Ask the CID on-call to log on as root onto IOC1611-427 and do the sequence:

service clsHV stop
service clsHV start

Multiple sample holder

In the unfortunate event the multiple sample holder breaks (usually somewhere around the A highlight section) due to the very intense use, you will have to contact either



- the beamline staff or
- the Floor Coordinator and ask for the technical-mechanical support on call.

Let the load-lock section up to the air, as when you load a new sample, and ask to the person on call to remove the multiple sample holder ladder from the **B** flange and substitute that with a blank flange.

Let the load-lock section pump till it reaches a pressure better than 6 mTorr. At this point you will be able to continue your experiment loading just one sample every time.