

OT Module Readout GUI

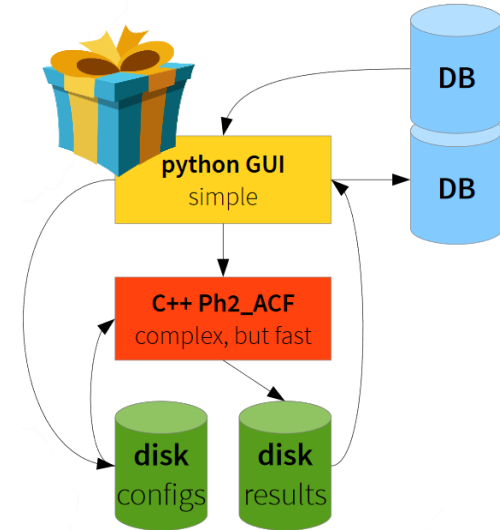
DAQ Workshop – 04.03.2021

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OT Module Readout GUI – Principle

- Python GUI interacts with performant C++ code (Ph2_ACF)
 - Using PyQt with QtCreator
 - Principle:
 - GUI communicates with construction DB to properly book the measured modules
 - GUI generates local .xml files to run the measurement(s)
 - Save results to disk
 - Transform results into matching DB data format (XML)
 - Upload to DB
- The GUI is a complex **command line executer**



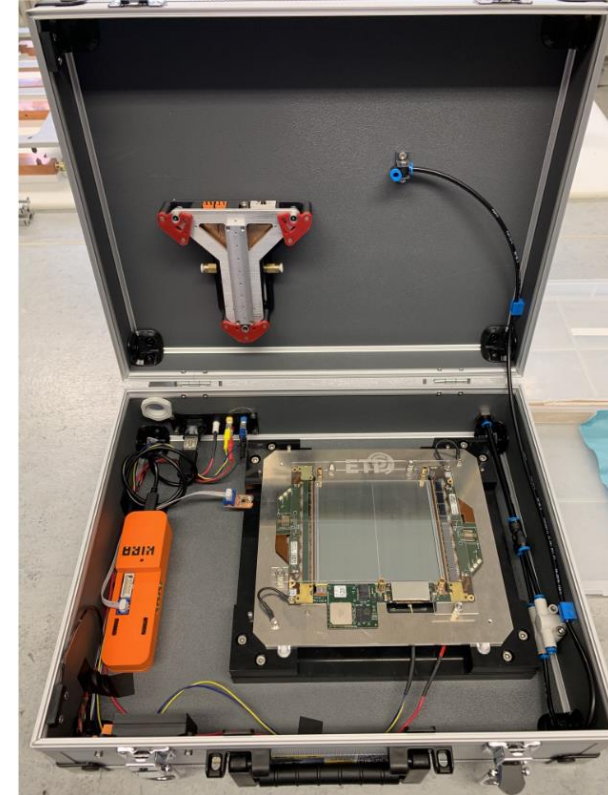
[Stefano 31.10.2019](#)

OT Module Readout GUI – GIPHT


- **GIPHT: Graphical user Interface for PHase 2 Tracker objects**
 - Control devices (FC7, power supplies, Arduino)
 - Measure 2S and PS modules during production in [test box](#)
 - Upload measurement results into construction DB
- **Target users:** People not very familiar with Ph2_ACF and details of module testing: Undergraduates, lab assistants, etc...
 - Easy and fast operation (just clicking)
- Planned first version for users with distribution of 2S (PS) test boxes (Q2/Q3 2021)


Module Test Box

- Mechanical fixation of module carrier
- HV and LV connections to SEH via patch panel
- HV interlock system for opened lid
- Optical fiber pass-through
- Air flux onto SEH and into box (manually controllable via valves)
- Humidity and temperature sensor with Arduino readout
- KIRA power distribution and KIRA control (via Arduino)



Basic Procedure

- 
- Configure devices
 - Add your devices to be used: Power supplies, FC7 , Arduinos
 - Configure voltages and firmware
 - Store settings
 - Configure measurement “**slots**”: Which power supply channel is connected to a module etc.
 - Measurement
 - Book your module (Bar code scanner)
 - DB script retrieves information about module (type etc...)
 - Start measurements
 - Upload results



Done once,
then stored

Device Settings

Graphical user Interface for PHase 2 Tracker objects - GIPHT v0.0

Measurement Results Settings

Ph2_ACF Folder: /home/readout/Ph2_ACF/ Ph2_ACF responsive Check Controlhub ON Check

Default XML: /home/readout/Ph2_ACF/settings/D19CDescription.xml

2S Module Block: /home/readout/Ph2_ACF/settings/D19C_2SBlock.xml

Device file: /home/readout/gipht/settings/Devices.xml Load devices Save devices

Results folder: /home/readout/Ph2_ACF/Results/ModuleTest_

Check devices on startup Show Plots STOP Device

Add FC7	No.	ID	Type	Connection	Settings	Con.	Status
Add PowerSupply	0	LV_RhodeSchwarz	PowerSupply	Ethernet	Settings	Readout successful - Idle	
Add Arduino		LV_Mod	Channel			10.00V 0.72A	
Remove Device		2	Channel				
		3	Channel				
		4	Channel				
	1	HV_Keithley2410	PowerSupply	Serial	Settings	Readout successful - Idle	
		LYON_HV	Channel			-300.01V -19.80µA	
		REAR	Channel				
	2	FC7Board_203	FC7	Ethernet	Settings	Readout successful - Idle	
	3	TestBox_Arduino	Arduino	Serial	Settings	Readout successful - Idle	
Add Channel							
Remove Channel							

PowerSupply: HV_Keithley2410 Index 1

ID: HV_Keithley2410

Model: Keithley

Port: Refresh /dev/ttyUSB0

Baudrate: 9600

Terminator: CRLF

Suffix: CRLF

Parity: Even Odd

FlowControl:

RemoveEcho:

Timeout (X s): 1

Close Check Save

No.	Channel	ID	V_max	I_max	V_set	U (V)	I (µA)	On
0	FRONT	ON_HV	800.00	105.00	-	-300.01	-19.80	<input checked="" type="checkbox"/>
1	REAR	REAR	800.00	-	-	0.00	-	<input type="checkbox"/>

Device Settings

Graphical user Interface for PHase 2 Tracker objects - GIPHT v0.0

Measurement Results Settings

Ph2_ACF Folder: /home/readout/Ph2_ACF/ Ph2_ACF responsive Check Controlhub ON Check

Default XML: /home/readout/Ph2_ACF/settings/D19CDescription.xml

2S Module Block: /home/readout/Ph2_ACF/settings/D19C_2SBlock.xml

Device file: /home/readout/gipht/settings/Devices.xml Load devices Save devices

Results folder: /home/readout/Ph2_ACF/Results/ModuleTest_

PowerSupply: HV_Keithley2410 Index 1

ID: HV_Keithley2410

Model: Keithley

Port: Refresh /dev/ttyUSB0

Baudrate: 9600

Check devices on startup Show Plots

Add FC7
Add PowerSupply
Add Arduino
Remove Device
Add Channel
Remove Channel

No.	ID	Type	Connection	Settings	Con.	Sta
0	LV_RhodeSchwarz	PowerSupply	Ethernet	Settings	Readout successful - Idle	10
	LV_Mod	Channel				
	2	Channel				
	3	Channel				
	4	Channel				
1	HV_Keithley2410	PowerSupply	Serial	Settings	Readout successful - Idle	
	LYON_HV	Channel			-300.01V -19.80µA	
	REAR	Channel				
2	FC7Board_203	FC7	Ethernet	Settings	Readout successful - Idle	
3	TestBox_Arduino	Arduino	Serial	Settings	Readout successful - Idle	

Define the Ph2_ACF folder, readout hardware default settings and where to store The device settings

No.	Channel	ID	V_max	I_max	V_set	U (V)	I (µA)	On
0	FRONT	ON_HV	800.00	105.00	-	-300.01	-19.80	Green
1	REAR	REAR	800.00	-	-	0.00	-	Red

Device Settings

Graphical user Interface for PHase 2 Tracker objects - GIPHT v0.0

Measurement Results Settings

Ph2_ACF Folder: /home/readout/Ph2_ACF/ **Ph2_ACF responsive Check** **Controlhub ON Check** PowerSupply: HV_Keithley2410 Index 1

Default XML: /home/readout/Ph2_ACF/settings/D19CDescription.xml

2S Module Block: /home/readout/Ph2_ACF/settings/D19C_2SBlock.xml

Device file: /home/readout/gipht/settings/Devices.xml **Load devices** **Save devices** ID: HV_Keithley2410

Results folder: /home/readout/Ph2_ACF/Results/ModuleTest_... Model: Keithley

Check devices on startup Show Plots Port: Refresh /dev/ttyUSB0

Baudrate: 9600

Device list of power supplies, Arduinos and (one) FC7.

No.	ID	Type	Connection	Settings	Con.
0	LV_RhodeSchwarz	PowerSupply	Ethernet	Settings	Readout successful - Idle
	LV_Mod	Channel			10.00V 0.72A
	2	Channel			
	3	Channel			
	4	Channel			
1	HV_Keithley2410	PowerSupply	Serial	Settings	Readout successful - Idle
	LYON_HV	Channel			-300.01V -19.80µA
	REAR	Channel			
2	FC7Board_203	FC7	Ethernet	Settings	Readout successful - Idle
3	TestBox_Arduino	Arduino	Serial	Settings	Readout successful - Idle

RemoveEcho

Timeout (X s): 1

Close **Check** **Save**

No.	Channel	ID	V_max	I_max	V_set	U (V)	I (µA)	On
0	FRONT	ON_HV	800.00	105.00	-	-300.01	-19.80	■
1	REAR	REAR	800.00	-	-	0.00	-	■

Device Settings

Graphical user Interface for PHase 2 Tracker objects - GIPHT v0.0

Measurement Results Settings

Ph2_ACF Folder: /home/readout/Ph2_ACF/ Ph2_ACF responsive Check Controlhub ON Check

Default XML: /home/readout/Ph2_ACF/settings/D19CDescription.xml

2S Module Block: /home/readout/Ph2_ACF/settings/D19C_2SBlock.xml

Device file: /home/readout/gipht/settings/Devices.xml Load devices Save devices

Results folder: /home/readout/Ph2_ACF/Results/ModuleTest_

Check devices on startup Show Plots STOP Device

Add FC7 Add PowerSupply Add Arduino Remove Device

No.	ID	Type	Connection	Settings	Con.	Status
0	LV_RhodeSchwarz	PowerSupply	Ethernet	Settings	Readout successful - Idle	
	LV_Mod	Channel			10.00V 0.72A	
	2	Channel				
	3	Channel				
	4	Channel				
1	HV_Keithley2410	PowerSupply	Serial			
	LYON_HV	Channel				
	REAR	Channel				
2	FC7Board_203	FC7	Ethernet			
3	TestBox_Arduino	Arduino	Serial	Settings	Readout successful - Idle	

Add Channel Remove Channel

PowerSupply HV_Keithley2410 Index 1

ID: HV_Keithley2410

Model: Keithley

Port: Refresh /dev/ttyUSB0

Baudrate: 9600

Terminator: CRLF

Suffix: CRLF

Parity: Even Odd

FlowControl:

RemoveEcho:

Timeout (X s): 1

Check Save

Connection settings for each device

ID	V_max	I_max	V_set	U (V)	I (µA)	On
ON_HV	800.00	105.00	-	-300.01	-19.80	Readout successful - Idle
1 REAR	REAR	800.00	-	0.00	-	Readout failed - Error

Device Settings

Graphical user Interface for PHase 2 Tracker objects - GIPHT v0.0

Measurement Results Settings

Ph2_ACF Folder: /home/readout/Ph2_ACF/ Ph2_ACF responsive Check Controlhub ON Check

Default XML: /home/readout/Ph2_ACF/settings/D19CDescription.xml

2S Module Block: /home/readout/Ph2_ACF/settings/D19C_2SBlock.xml

Device file: /home/readout/gipht/settings/Devices.xml Load devices Save devices

Results folder: /home/readout/Ph2_ACF/Results/ModuleTest_

Check devices on startup Show Plots STOP Device

PowerSupply: HV_Keithley2410 Index 1

ID: HV_Keithley2410

Model: Keithley

Port: Refresh /dev/ttyUSB0

Baudrate: 9600

Terminator: CRLF

Suffix: CRLF

Parity: Even Odd

FlowControl: RemoveEcho: Timeout (X s): 1

Close Check Save

No.	ID	Type	Connection	Settings	Con.	Status
0	LV_RhodeSchwarz	PowerSupply	Ethernet	Settings	Readout successful - Idle	
	LV_Mod	Channel			10.00V 0.72A	
	2	Channel				
	3	Channel				
	4	Channel				
1	HV_Keithley2410	PowerSupply	Serial	Settings	Readout successful - Idle	
	LYON_HV	Channel			-300.01V -19.80µA	
	REAR	Channel				
2	FC7Board_203	FC7	Ethernet	Settings	Readout successful - Idle	
3	TestBox_Arduino	Arduino	Serial	Settings	Readout successful - Idle	

No.	Channel	ID	V_max	I_max	V_set	U (V)	I (µA)	On
0	FRONT	ON_HV	800.00	105.00	-	-300.01	-19.80	Green
1	REAR	REAR	800.00	-	-	0.00	-	Red


Channel settings for power supplies

Measurements

- Offset
- Offset + Noise
- IV Curve
- Condition data
 - Temperature
 - RH
 - Currents
- (KIRA)
- FullTest:
 - All of the above

Graphical user interface for PHASE 2 Tracker objects - GIPHT v0.0

Measurement Results Settings DataBase

 Run: 123 Offset Noise KIRA IV Condition FullTest

Slots: 1 IV Settings: 1 -1 -2

Operator: Stefan

Location: KIT

Board: -

Power supply: -

Arduino: -

```

||| Init PS with /home/readout/gipht/settings/Measurements/IV_0.xml
||| Save initial status. Channel is off, voltage set 0
||| Start IV curve on module module01 (PowerSupply: Resistor Channel: FRONT)
||| Set 0V
||| V: 0.000000V t: 0.000000
||| Set -1V
||| V: -1.000000V t: 0.000000
||| Set -2V
||| V: -2.000000V t: 0.000000
||| module01
||| -0.000863248,778109e-12,01-03-21 08:05:38
||| -1.000116,50286e-12,01-03-21 08:05:40
||| -2.00028,6,46164e-12,01-03-21 08:05:41
||| Set the channel back to its initial state.
||| Store values in results file
|||
  
```

Change default settings

Setting	Value	Valid

Task: Results stored (100%)


Run: Run finished (100%)

Measurements

- Offset
- Offset + Noise
- IV Curve
- Condition data
 - Temperature
 - RH
 - Currents
- (KIRA)
- FullTest:
 - All of the above

Graphical user interface for PHASE 2 Tracker objects - GIPHT v0.0

Measurement Results Settings DataBase

 Run: 123

Slots: 1

Operator: Stefan

Location: KIT

Board: -

Power supply: -

Arduino: -

Offset
 Noise
 KIRA
 IV
 Condition
 FullTest

IV Settings: 1 -1 -2

Slot 0: module01

Change default settings

Setting	Value	Valid

Task: Results stored (100%)

Run: Run finished (100%)

```

||| Init PS with /home/readout/gipht/settings/Measurements/IV_0.xml
||| Save initial status. Channel is off, voltage set 0
||| Start IV curve on module module01 (PowerSupply: Resistor Channel: FRONT)
||| Set 0V
||| V: 0.000000V t: 0.000000
||| Set -1V
||| V: -1.000000V t: 0.000000
||| Set -2V
||| V: -2.000000V t: 0.000000
||| module01
||| -0.000863248,778109e-12,01-03-21 08:05:38
||| -1.000116,50286e-12,01-03-21 08:05:40
||| -2.00028,646164e-12,01-03-21 08:05:41
||| Set the channel back to its initial state.
||| Store values in results file
|||
  
```

Results

- Each result file is saved **by the Ph2_ACF** into a previously made folder
 - Folder name + incrementing number (incremented by the GUI)
- After a measurement the GUI searches for new files in the folder and shows them in a tree
 - Each file can be opened:
 - .root files: TBrowser
 - .json files: Texteditor
 - .csv files: Texteditor + Matplotlib plot (IV curve)
- Each result can then be converted in an uploadable .xml format
 - DB Handler retrieves unique run number from construction data base
- Afterwards the data can be uploaded

Results

Graphical user Interface for PHase 2 Tracker objects - GIPHT v0.0

Measurement Results Settings DataBase

Convert Upload

Run	Date	Operator	Location	File	XML DB File	Comment	DB Run Number	Status
- 123	01-03-2021 08:05:36	Stefan	KIT	/home/readout/Ph2_ACF/Results/ModuleTest_123/ IV_module01.csv	module01_IV_286.xml		286	Converted - ready for upload

BACKUP

GIPHT Software Structure

