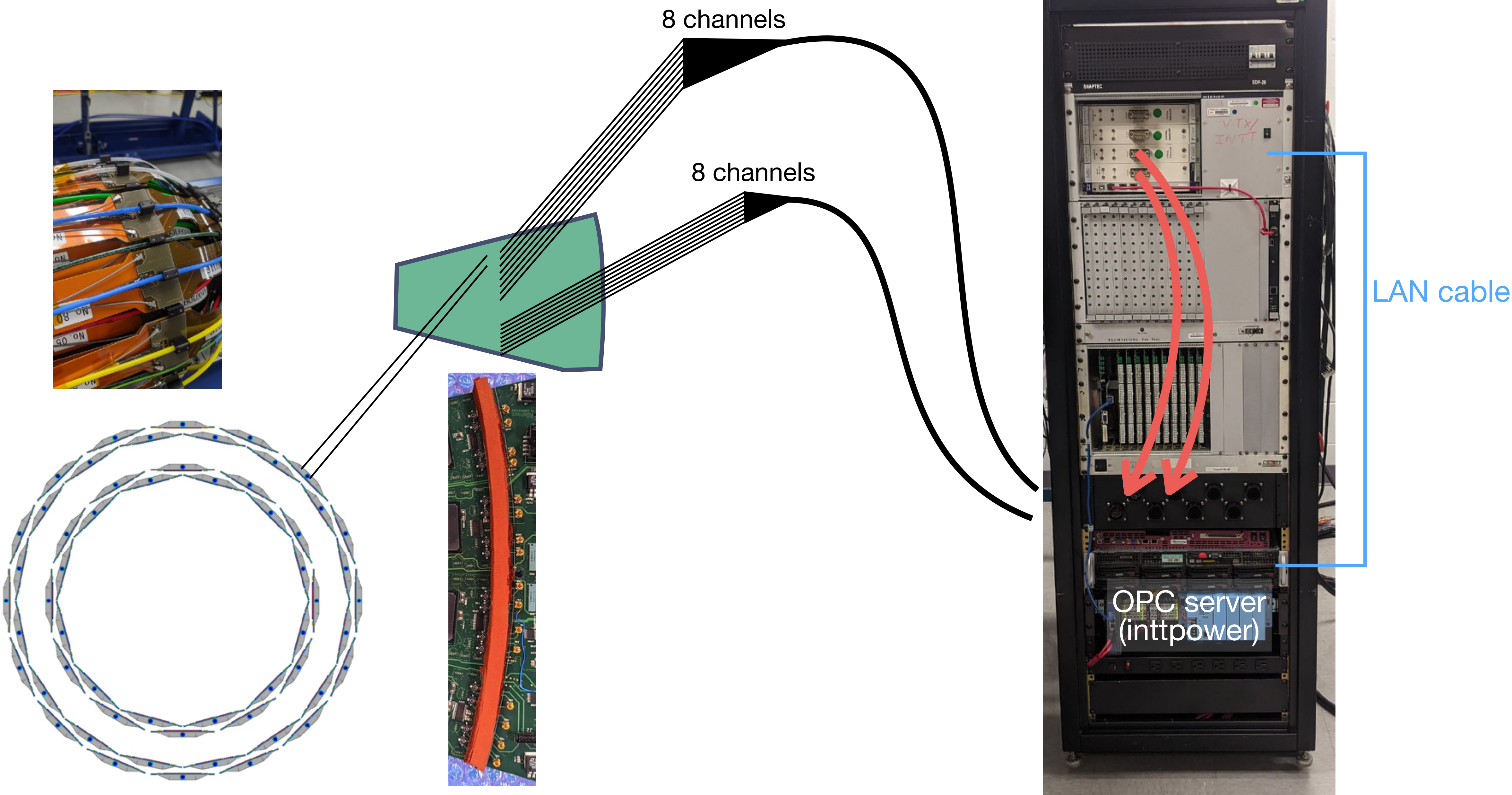


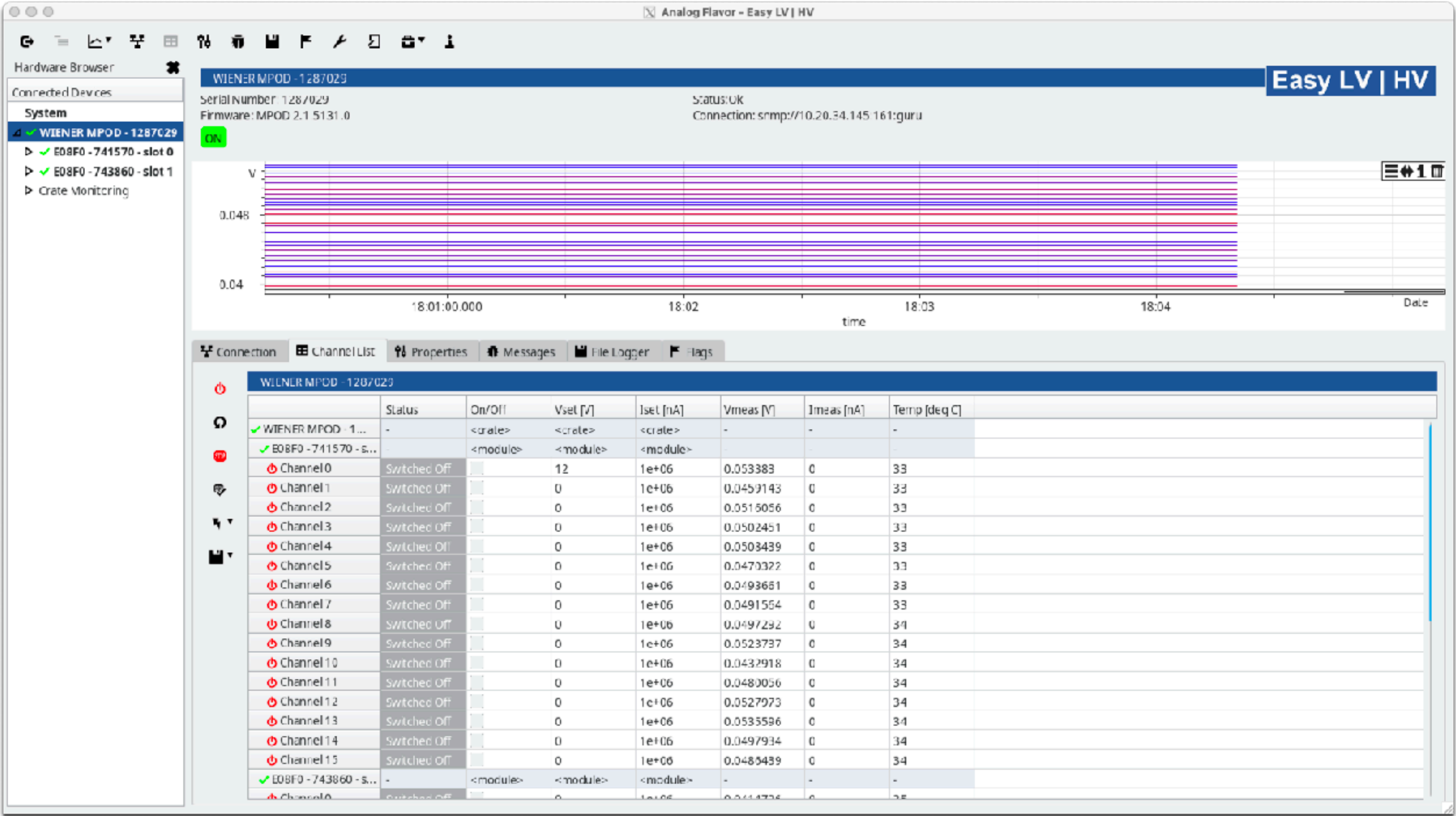
Status of INTT HV app

G. Nukazuka (RBRC)

HV of INTT in the Silicon lab



Current operation in the silicon lab



The commercial GUI app is used. It's run in the OPC server and communicates with the MPOD through the router with LAN cables. Normally, we run it over SSH.

MPOD

We need to know about the Mpod module more

[illegible]

<https://www.wiener-d.com/product/mpod-hv-module/>



[Main page](#)
[Community portal](#)
[Current events](#)
[Recent changes](#)
[Random page](#)
[Help](#)

[sPHENIX detector](#)
[Magnet](#)
[EMCAL](#)
[HCAL](#)
[Tracking](#)
[TPC](#)
[MVTX](#)
[INTT](#)
[Electronics](#)
[Beam tests](#)
[Software](#)
[DAQ](#)
[Trigger](#)

[Collaboration](#)
[Meetings](#)

Page

[Discussion](#)

Read

[Edit](#)
[Edit source](#)
[View history](#)

Bias Power System

Contents [\[hide\]](#)

- 1 [Hardware](#)
- 2 [Setup](#)
 - 2.1 [Silicon Lab](#)
 - 2.2 [IR](#)
- 3 [Operation of the MPOD module with SNMP commands](#)
 - 3.1 [Defined Status](#)
- 4 [Operation GUI](#)
- 5 [Misc](#)

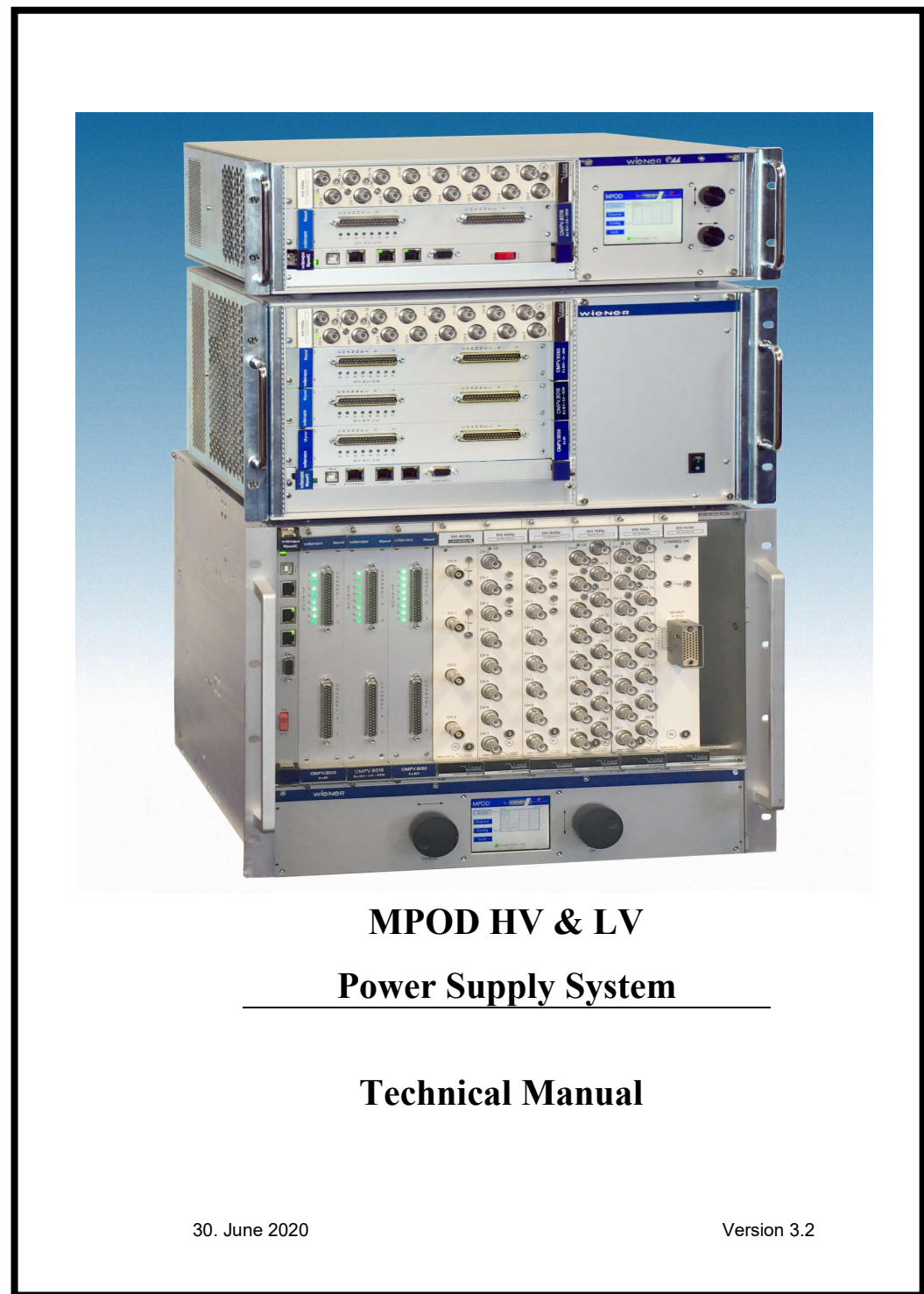
Hardware [\[edit\]](#) [\[edit source\]](#)

[Wiener's MPOD](#) is used to apply bias to the silicon sensors. The features of our MPOD module EHS F605p-F are:

- #ch: 16
- Max Voltage: 0.5 kV
- Max Current: 15 mA
- Polarity: positive
- Ripple: < 10 mV

You can get manuals from [the official homepage](#). Wiener MPod Instruction [Wiener MPOD](#)

https://wiki.sphenix.bnl.gov/index.php/Bias_Power_System



Parameter	Mzbit	Acrss	Type
sysMainSwitch	1	R/W	i
system	1	R/W	i
sysVccByReset	1	R/W	i
outputNumber	1	R	i
groupNumber	1	R	i
outputName	320	R	string
outputGroup	320	R	i
outputStatus	320	R	F
outputMeasurementSenseVoltage	320	R	F
outputMeasurementTerminalVoltage	320	R	F
outputMeasurementCurrent	320	R	F
outputMeasurementTemperature	320	R	i
outputSwitch	320	R/W	i
outputCharge	320	R/W	F
outputCurrent	320	R/W	F
outputChargeRate	320	R/W	F
outputVoltageFullRate	320	R/W	F
outputSuperIsolationBehavior	320	R/W	i
outputSuperIsolationMaxSenseVoltage	320	R/W	F
outputSuperIsolationMaxSenseVoltage	320	R/W	F
outputSuperIsolationMaxSenseVoltage	320	R/W	F
outputSuperIsolationMaxTemperature	320	R/W	F
outputConfMaxSenseVoltage	320	R	F
outputConfMaxTerminalVoltage	320	R	F
outputConfMaxCurrent	320	R	F
outputConfMaxPower	320	R	F
sensornumber	1	R	i
sensorTemperature	12	R	i
sensorWarningThreshold	12	R/W	i
sensorFailureThreshold	12	R/W	i
sensorComponentName	4	R/W	string
pollIntervalVersion	1	R	string
pwrSetpointVersion	1	R	string
pollDurationTime	1	R	string
pollRefreshAccess	1	R/W	string
pollRefreshVersion	1	R	string
fastStartNumber	1	R	string
fastStartVersion	1	R	string
fastStartDiffRatio	1	R	string
fastStartTemperature	1	R	i
fastStartMinDiffRatio	1	R/W	i
fastStartMinSpeed	1	R/W	i
fastStartMinOffset	1	R	i
fastSpeed	6	R	i

(see NNMP per structure at end of manual for full structure)

11 SNMP examples for MPOD and high voltage EHS/EDS module

```

1  # SNMP example for control of long Multi-Channel High Voltage Power Supply Modules in
2  # a W-E-N-E-R MPOD case
3
4  # smmpget Oid v2 m=-WENER-CRAT-MB <public 192.168.16.222 output/voltage> u100 %
5  # The command will request the value from the selected cell voltage
6
7  # smmpset Oid v2 m=-WENER-CRAT-MB <public 192.168.16.222 output/voltage> u100 %
8  # smmpset starts a SNMP request
9
10 # 2c: The parameter specifies the version of the SNMP v2c. The WENER devices use SNMP v2c
11 # 4d: The parameter should be replaced with the path to the WENER/CRAT-MB file.
12 # It is not needed in case the file is in the current directory.
13 # m=-WENER-CRAT-MB. This parameter will be the command to be called at the WENER-CRAT-MB
14 # to resolve the Oid name
15 # c=public. This specifies which community of value can be accessed
16 # 192.168.16.222. The IP address of the MPOD crate.
17 # output/voltage/u100. The SNMP name to be resolved into the value of a module in the second
18 # part of the MPOD crate id. channels 0
19
20 # smmpget Oid v2 m=-WENER-CRAT-MB <public 192.168.16.222 output/voltage> u100 % 60
21 # The command returns a floating point value to be the dependent cell voltage
22
23 # c=genr. This specifies the community for write instruction
24 # f 60: The 'f' specifies the write value as a floating point format value.
25 # The 60 is the write value 60V
26
27 # smmpset Oid v2 m=-WENER-CRAT-MB <genr 192.168.16.222 output/voltage> u100 1 %
28 # This command will set a switch on the HV for one channel.
29 # output/voltage/u100.1. While of an integer format value to the item outputSwitch.
30 # With that item it is possible to switch different functions for instance "
31 # set On/Off
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
9
```

<https://file.wiener-d.com/documentation/MPOD>

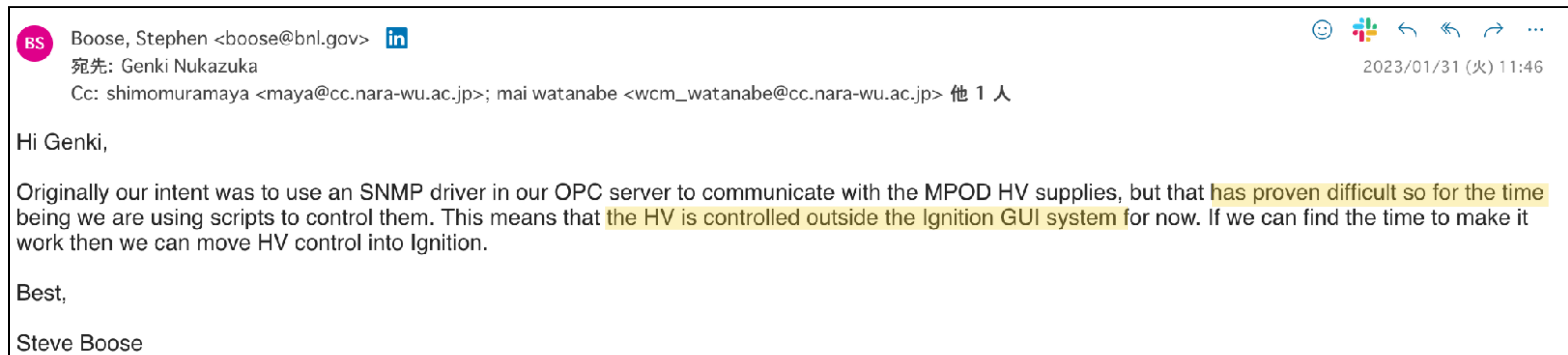
Requirements for the HV application

We need to define the requirements for the application.

- Turning HV ON/OFF
 - All
 - each ROC
 - each channel
 - ? each half-ladder
- Configuration of operation
 - Operation voltage
 - Voltage limit
 - Current limit
 - Ramping speed
 - ? Different configuration for each ch/half-ladder/ROC?
- Monitoring
 - Voltage and current for each channel
 - Visualization by graphs
 - ? any other parameters?
- Operation logs
 - Timestamp and operation
 - Voltage and current
 - ? Are they stored in the sPHENIX database?
- Misc
 - Shifter/Expert mode
- It should work in 1008, and the silicon lab

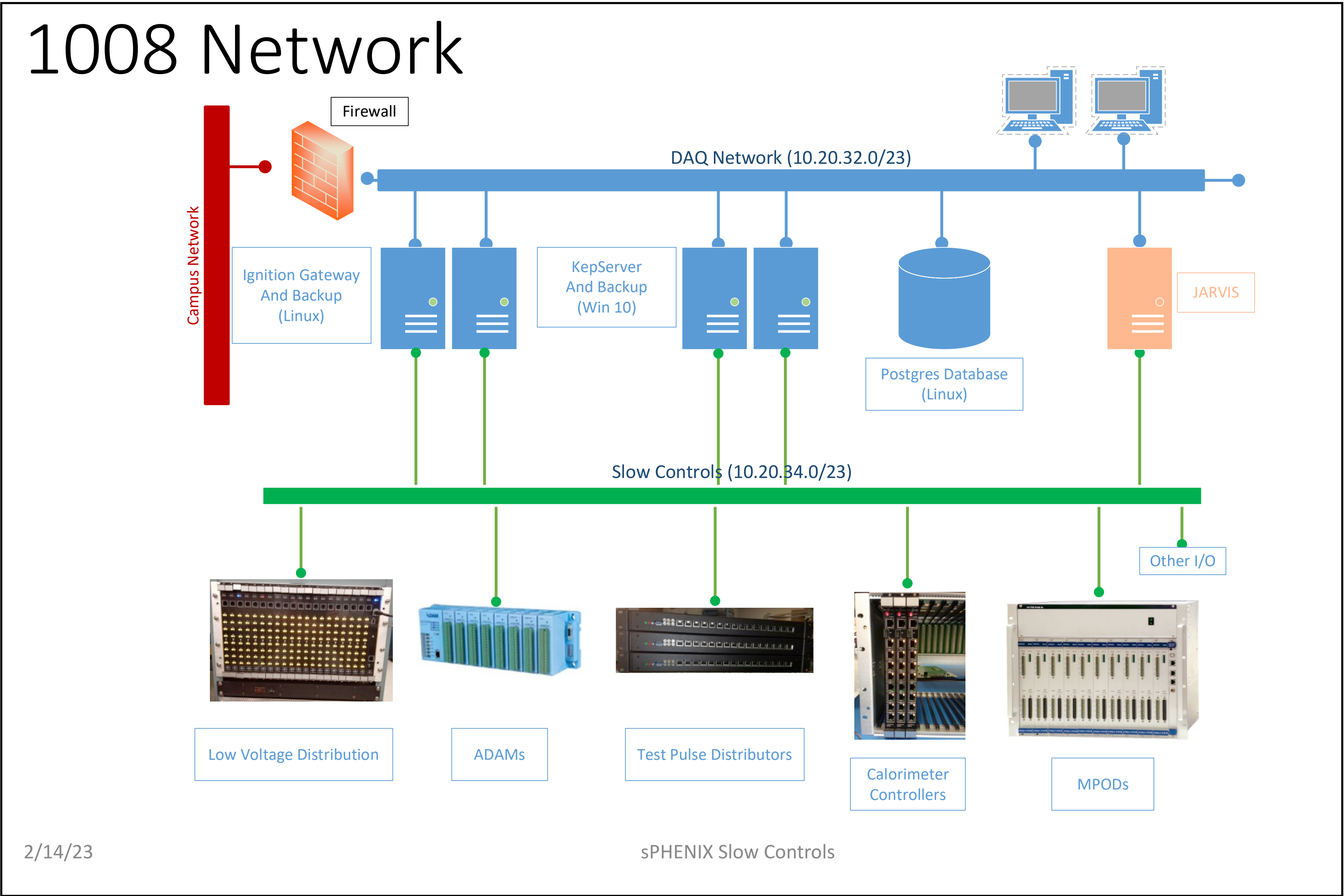
Before starting...

The sPHENIX standard framework Ignition (designer) is used for LV GUI. SNMP protocol is used for communicating with MPOD, but

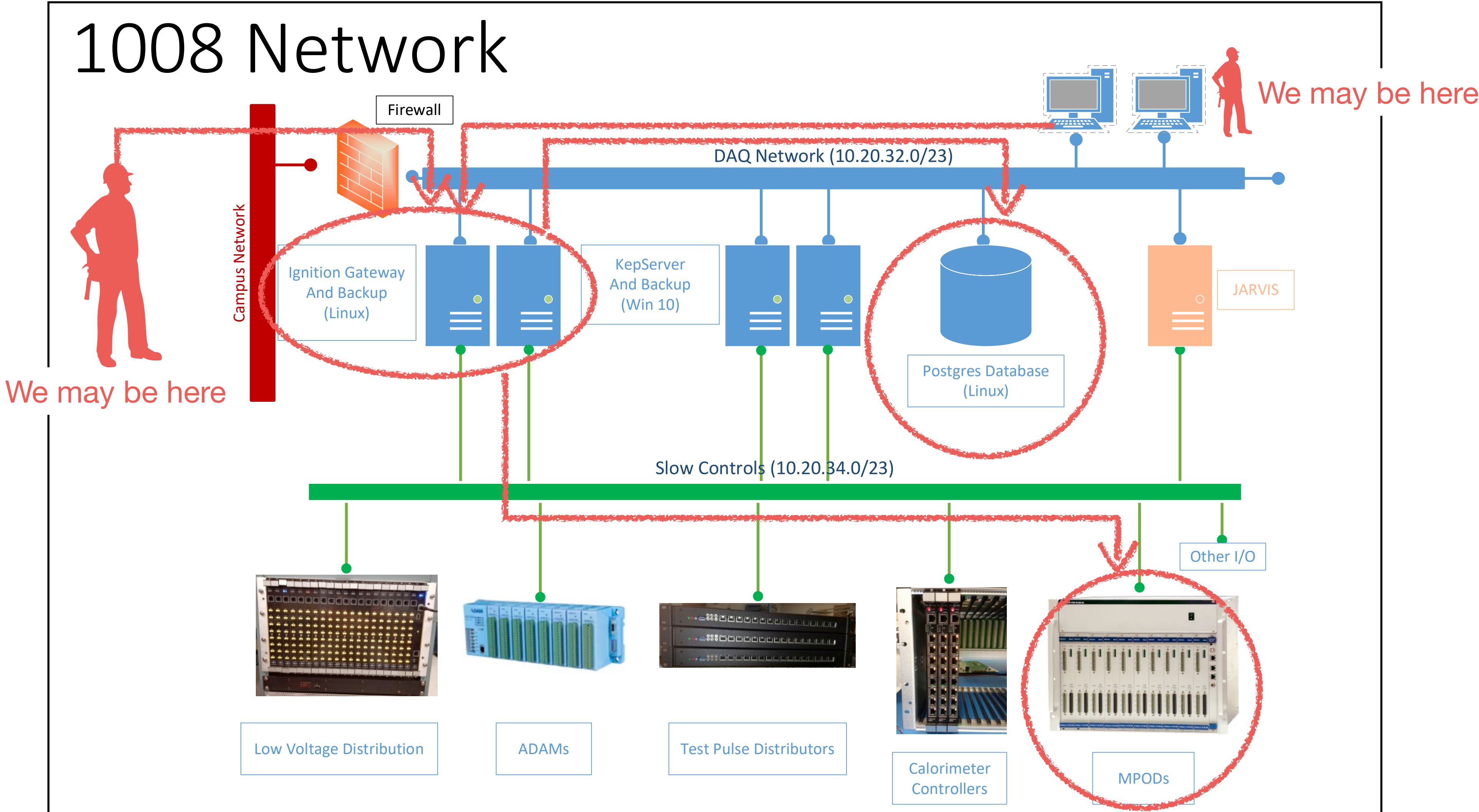


Currently, it may be good to start without Ignition, so I used what I could use. When we can handle SNMP with Ignition, we may migrate to Ignition.

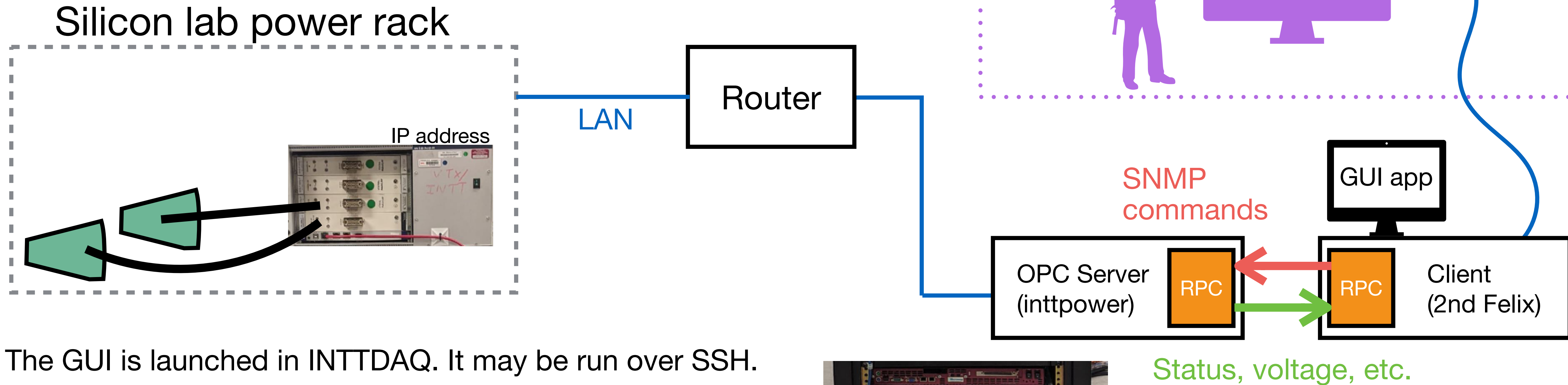
HV app : Connections in 1008



HV app : Connections in 1008



HV app: Connections in the silicon lab

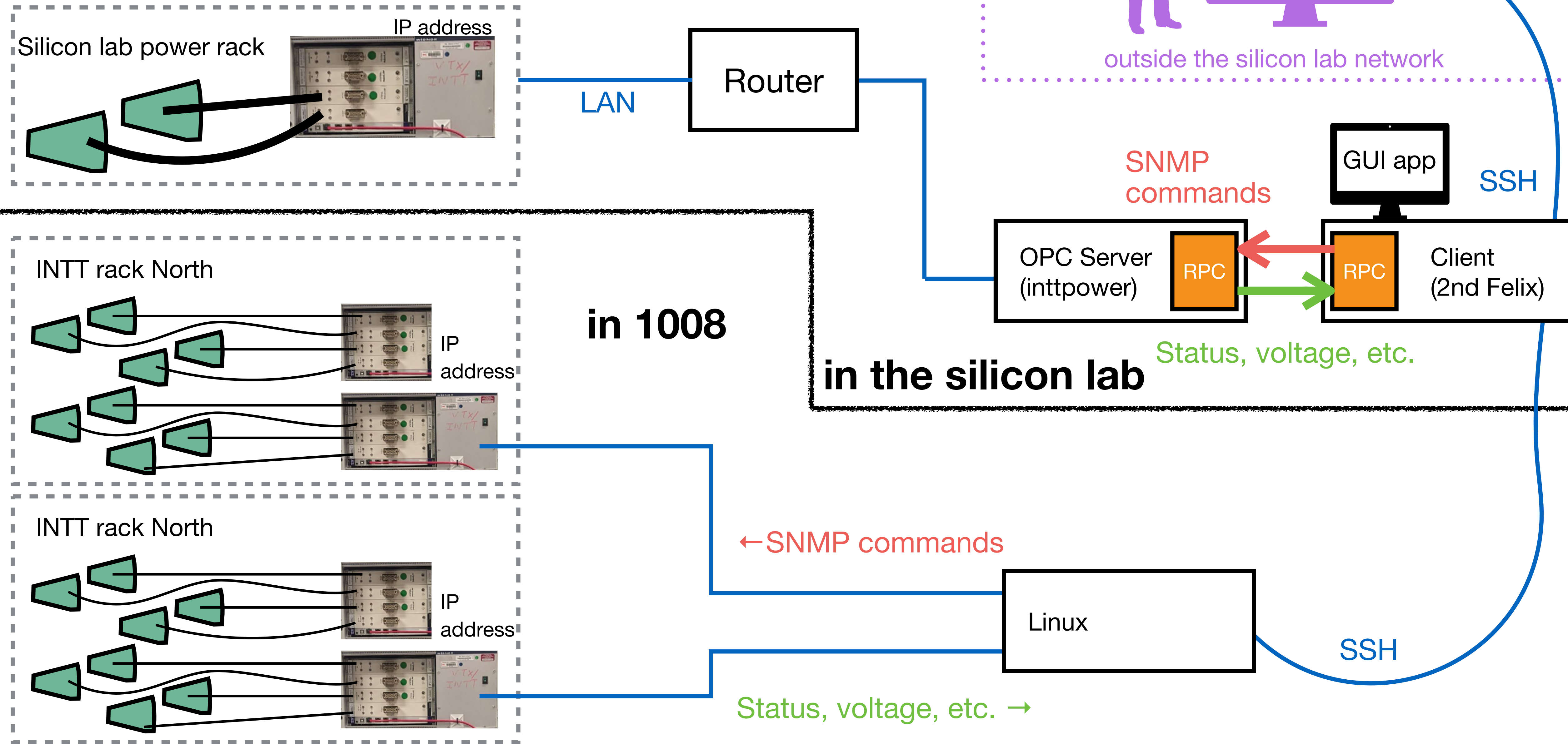


The GUI is launched in INTTDAQ. It may be run over SSH. INTTPOWER, the OPC server in the power rack, has access to the MPOD. I didn't try launching GUI in INTTPOWER.

Similarly to INTT ExpertGUI, I hired RPC to control MPODs from client PCs. RPC may not be needed in 1008 because the linux machine can access to the MPODs directly.



HV app: both cases

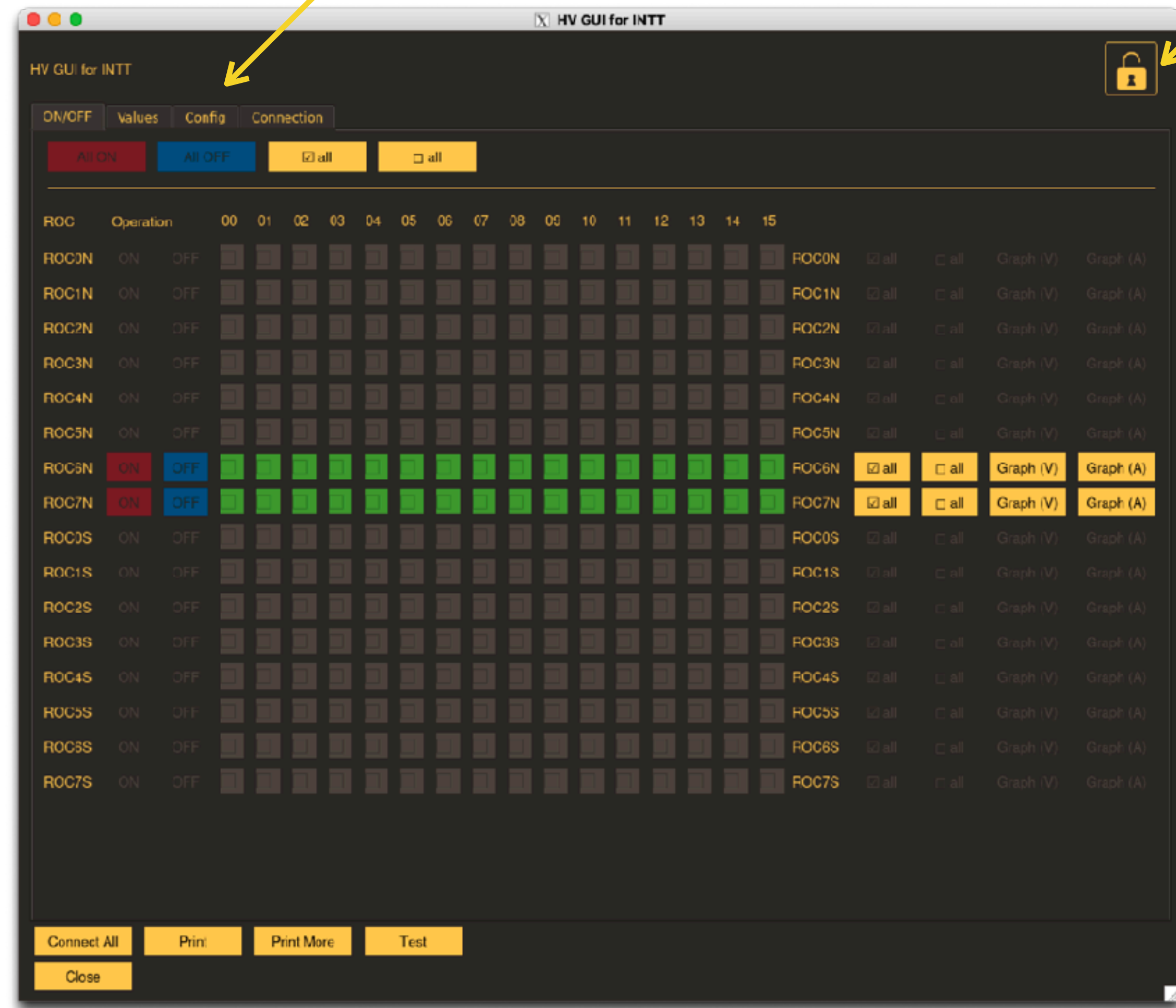


The GUI

HV_GUI.py

Tab grouping

Shifter/Expert mode



Language: Python3

Library: PySimpleGUIQt

A wrapper of PyQt. The standard python library Tkinter (or PySimpleGUI) is too slow to use over SSH.

RPC: gRPC (same as INTT ExpertGUI), ver 1.49.1

The latest version (1.52.0) has a problem...

SNMP to MPODs

libMpod.py and HV_server.py

I modified Maki's library (intt@inttpower:~/power/snmp/header.py).

Basically, the library does shell commands, for example

```
snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 10.20.34.145 outputMeasurementSenseVoltage.u15
```


The GUI: Overview page is needed...

Not implemented yet...

It should show the brief status of HV.

For example:

FVTX Bias Control

File

Figure/Watch Mode

Watch

Tue Jan 24 16:20:24 EST 2012

Mainframe Status

On

All Channels On/Off

On: 0

Off: 48

FVTX North

Channel	On/Off	Demand Volt (V)	Measur. Volt (V)	Volt. Trend	Current Limit (uA)	Measur. Curr. (uA)	Curr. Trend	Status	Age
NW0-A	Off	73.33	0.14	Trend	15	0	Trend	Ok	1
NW0-B	On	73.33	0.05	Trend	11	0	Trend	Uc	1
NW1-A	Off	73.33	0.05	Trend	10	0	Trend	Ok	1
NW1-R	Off	73.33	0.05	Trend	1F	0	Trend	Ok	1
NW2-A	Off	73.33	0.15	Trend	15	0	Trend	Ok	1
NW2-B	On	73.33	0.04	Trend	11	0	Trend	Uc	1
NW3-A	Off	73.33	0.04	Trend	1F	0	Trend	Ok	1
NW3-R	Off	73.33	0.04	Trend	1F	0	Trend	Ok	1
NW4-A	Off	73.33	0.14	Trend	15	0	Trend	Ok	1
NW4-B	On	73.33	0.05	Trend	11	0	Trend	Uc	1
NW5-A	Off	73.33	0.05	Trend	1F	0	Trend	Ok	1
NW5-D	Off	73.33	0.15	Trend	15	0	Trend	Ok	1
NE0-A	Off	73.33	0.04	Trend	1F	0	Trend	Ok	1
NE0-D	Off	73.33	0.15	Trend	15	0	Trend	Ok	1
NE1-A	On	73.33	0.04	Trend	11	0	Trend	Uc	1
NE1-R	Off	73.33	0.05	Trend	1F	0	Trend	Ok	1
NE2-A	Off	73.33	0.15	Trend	15	0	Trend	Ok	1
NE2-D	Off	73.33	0.15	Trend	15	0	Trend	Ok	1
NE3-A	On	73.33	0.05	Trend	11	0	Trend	Uc	1
NE3-R	Off	73.33	0.05	Trend	1F	0	Trend	Ok	1
NE4-A	Off	73.33	0.15	Trend	15	0	Trend	Ok	1
NE4-B	On	73.33	0.05	Trend	11	0	Trend	Uc	1
NE5-A	On	73.33	0.05	Trend	11	0	Trend	Uc	1
NE5-R	Off	73.33	0.05	Trend	1F	0	Trend	Ok	1

FVTX South

Channel	On/Off	Demand Volt (V)	Measur. Volt (V)	Volt. Trend	Current Limit (uA)	Measur. Curr. (uA)	Curr. Trend	Status	Age
SW0-A	Off	70.00	3.35	Trend	15	0	Trend	Ok	1
SW0-B	On	70.00	3.29	Trend	15	0	Trend	Uc	1
SW1-A	Off	70.00	3.25	Trend	15	0	Trend	Ok	1
SW1-R	Off	70.00	3.24	Trend	15	0	Trend	Ok	1
SW2-A	Off	70.00	3.35	Trend	15	0	Trend	Ok	1
SW2-B	On	70.00	3.29	Trend	15	0	Trend	Uc	1
SW3-A	Off	70.00	3.24	Trend	15	0	Trend	Ok	1
SW3-R	Off	70.00	3.25	Trend	15	0	Trend	Ok	1
SW4-A	Off	70.00	3.35	Trend	15	0	Trend	Ok	1
SW4-B	On	70.00	3.29	Trend	15	0	Trend	Uc	1
SW5-A	Off	70.00	3.24	Trend	15	0	Trend	Ok	1
SW5-D	Off	70.00	3.35	Trend	15	0	Trend	Ok	1
SE0-A	Off	70.00	3.24	Trend	15	0	Trend	Ok	1
SE0-D	Off	70.00	3.35	Trend	15	0	Trend	Ok	1
SE1-A	On	70.00	3.29	Trend	15	0	Trend	Uc	1
SE1-R	Off	70.00	3.24	Trend	15	0	Trend	Ok	1
SE2-A	Off	70.00	3.35	Trend	15	0	Trend	Ok	1
SE2-D	Off	70.00	3.35	Trend	15	0	Trend	Ok	1
SE3-A	On	70.00	3.29	Trend	15	0	Trend	Uc	1
SE3-R	Off	70.00	3.24	Trend	15	0	Trend	Ok	1
SE4-A	Off	70.00	3.35	Trend	15	0	Trend	Ok	1
SE4-B	On	70.00	3.29	Trend	15	0	Trend	Uc	1
SE5-A	On	70.00	3.29	Trend	15	0	Trend	Uc	1
SE5-R	Off	70.00	3.15	Trend	15	0	Trend	Ok	1

Information MPOD module by module should be shown though each module has 16 channels.

We need to define parameters to be shown: status (for example: what is good/bad?)

The GUI : Network configuration

HV_connection.py

Configuration file (should be taken from the sPHENIX database)

Connection information for each MPOD module.

HV GUI for INTT

ON/OFF

Values

Config

Connection

Server:

IP address of the server

RPC process:

Connection config file:

/home/inttdev/HV/connection/template.txt

Browse

Load

ROC0N	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC1N	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC2N	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC3N	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC4N	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC5N	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC6N	192.168.100.35:50051	10.20.34.145:161	0	✓ Connected	Connect	Reset Emergency	Reset Event
ROC7N	192.168.100.35:50051	10.20.34.145:161	1	✓ Connected	Connect	Reset Emergency	Reset Event
ROC0S	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC1S	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC2S	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC3S	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC4S	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC5S	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC6S	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event
ROC7S	none	none	0	⊖ Not used	Connect	Reset Emergency	Reset Event

Connect All

Print

Print More

Test

Close

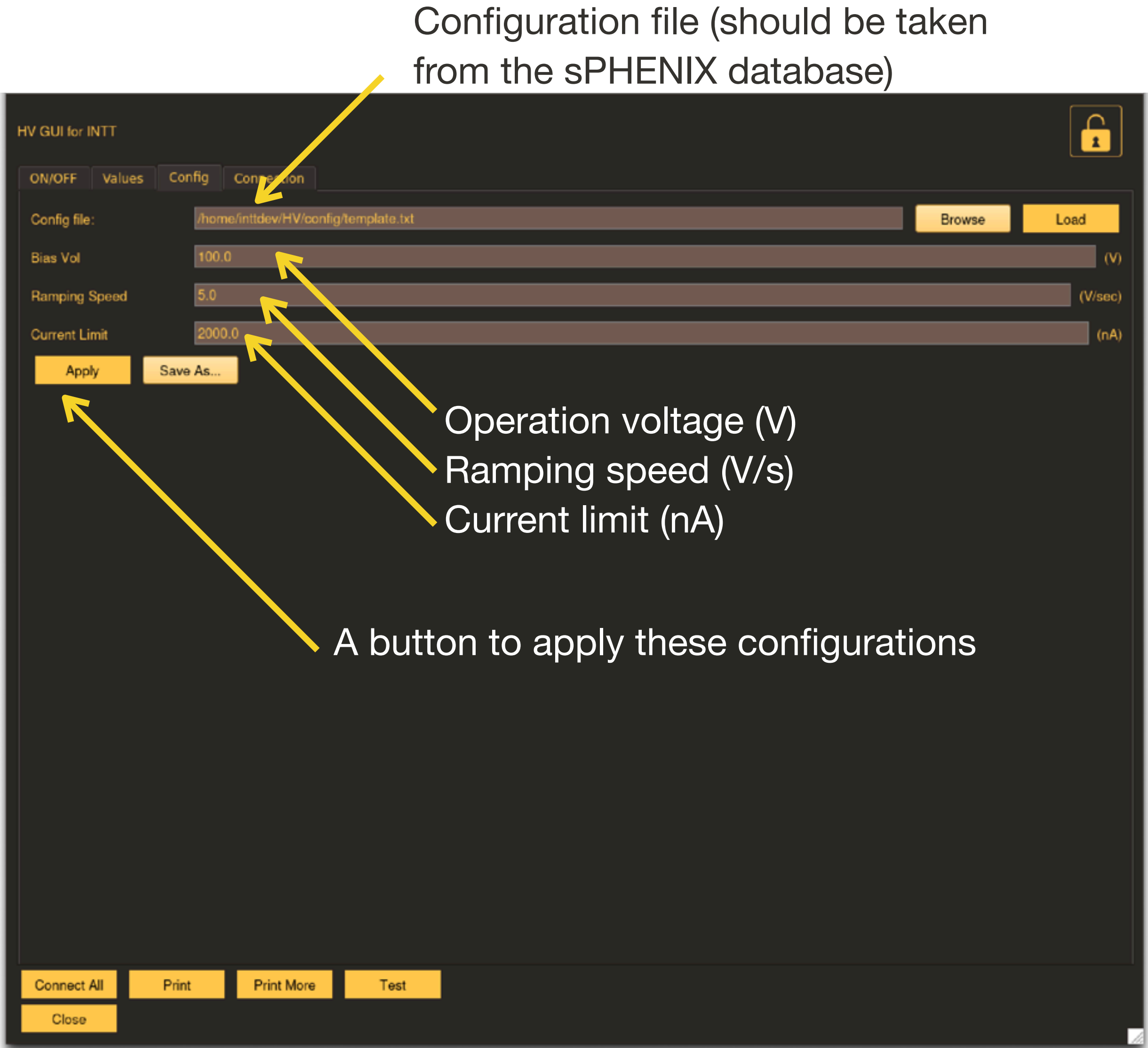
```
1 #####
2 #
3 # Connection configuration #
4 #
5 #####
6
7 ROC0N not_used
8 ROC1N not_used
9 ROC2N not_used
10 ROC3N not_used
11 ROC4N not_used
12 ROC5N not_used
13 ROC6N not_used
14 ROC7N 10.20.34.145 161 0
15 ROC0S not_used
16 ROC1S not_used
17 ROC2S not_used
18 ROC3S not_used
19 ROC4S not_used
20 ROC5S not_used
21 ROC6S not_used
22 ROC7S not_used
```



Connection status

The GUI: Operation configuration

HV_config.py



```
1 #####
2 #
3 # Configuration for HV
4 #
5 #####
6
7 # voltage [value (V)]
8 voltage 100
9
10 # speed [value (V/sec)]
11 speed 5
12
13 # current_limit [value (nA)]
14 current_limit 2000
```

All parameters available should be shown in this tab.
All modules get the same parameters for the moment. Is it OK?

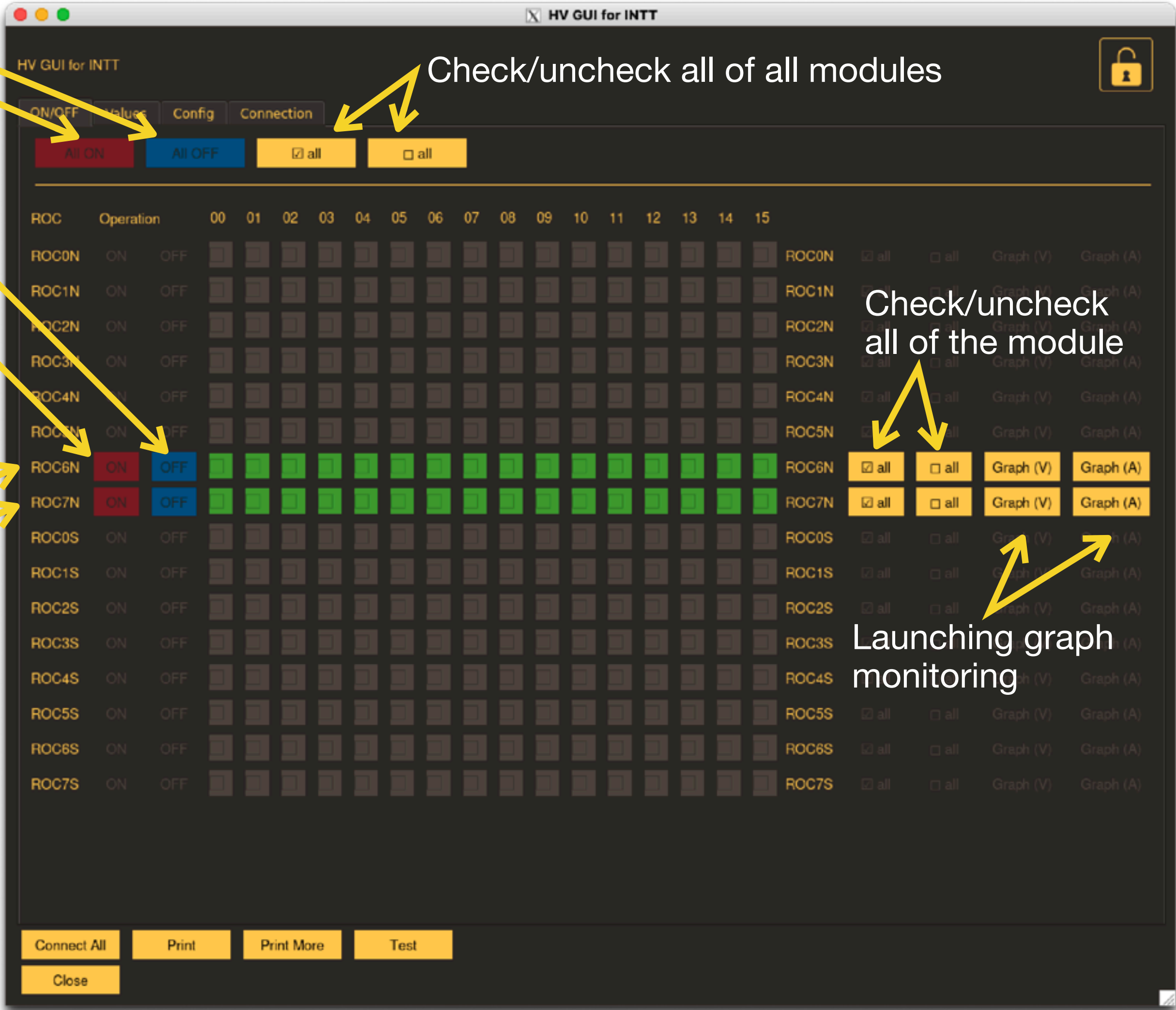
The GUI: ON/OFF

HV_on_off.py

ON/OFF buttons for checked channels of **all modules**

ON/OFF buttons for checked channels of **the module**

Only active modules are enabled



☐ : not operated

☒ : to be operated

☒ : It's ON now.

☒ : It's OFF now.

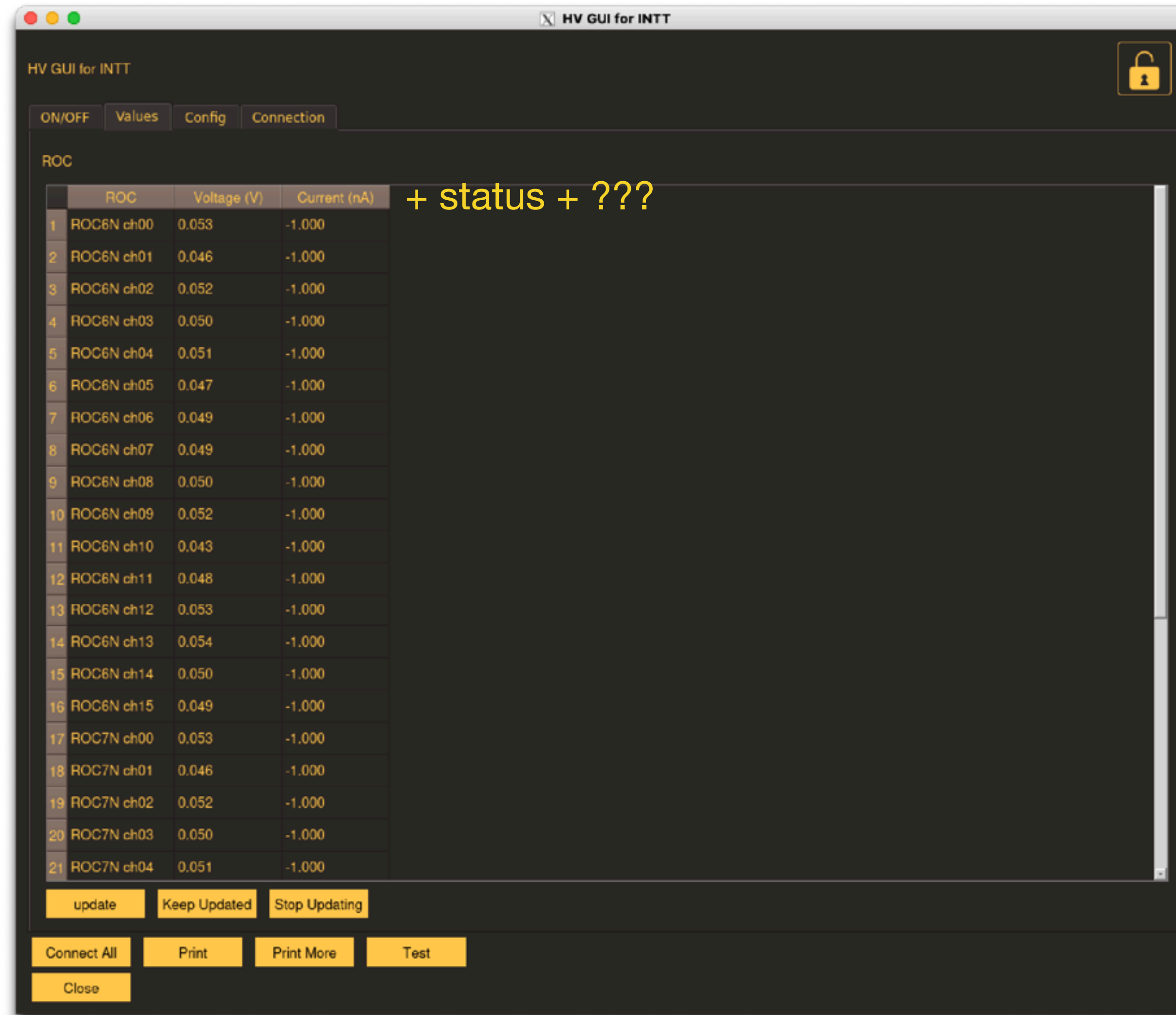
Check/uncheck all of the module

Launching graph monitoring

☐ is a status indicator + selection of operated channels.
I'm not sure whether it's a good idea or not.

The GUI: Monitoring values

HV_value_viewer.py



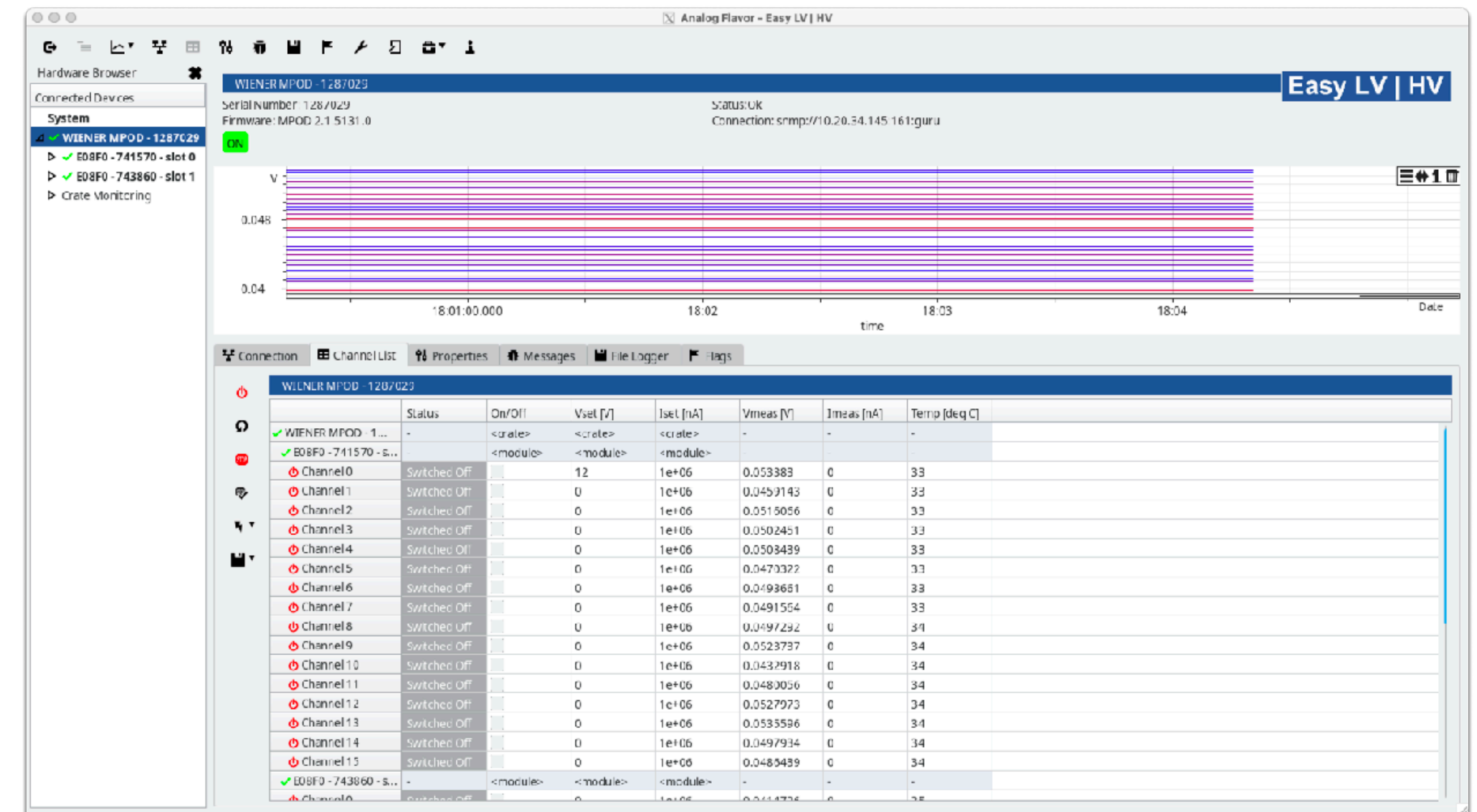
We need to see the values.

Is there a better idea to show so many values?

The GUI: Visual monitoring

Monitoring voltage and current by graphs is necessary, but...

- Is data (voltage, current. etc.) saved to the database?
- What should be monitored?
 - ROC by ROC? individual window for voltage and current?
- Technical choice?
 - Ignition designer
 - Python Matplotlib
 - ROOT
 - PostgreSQL + Grafana



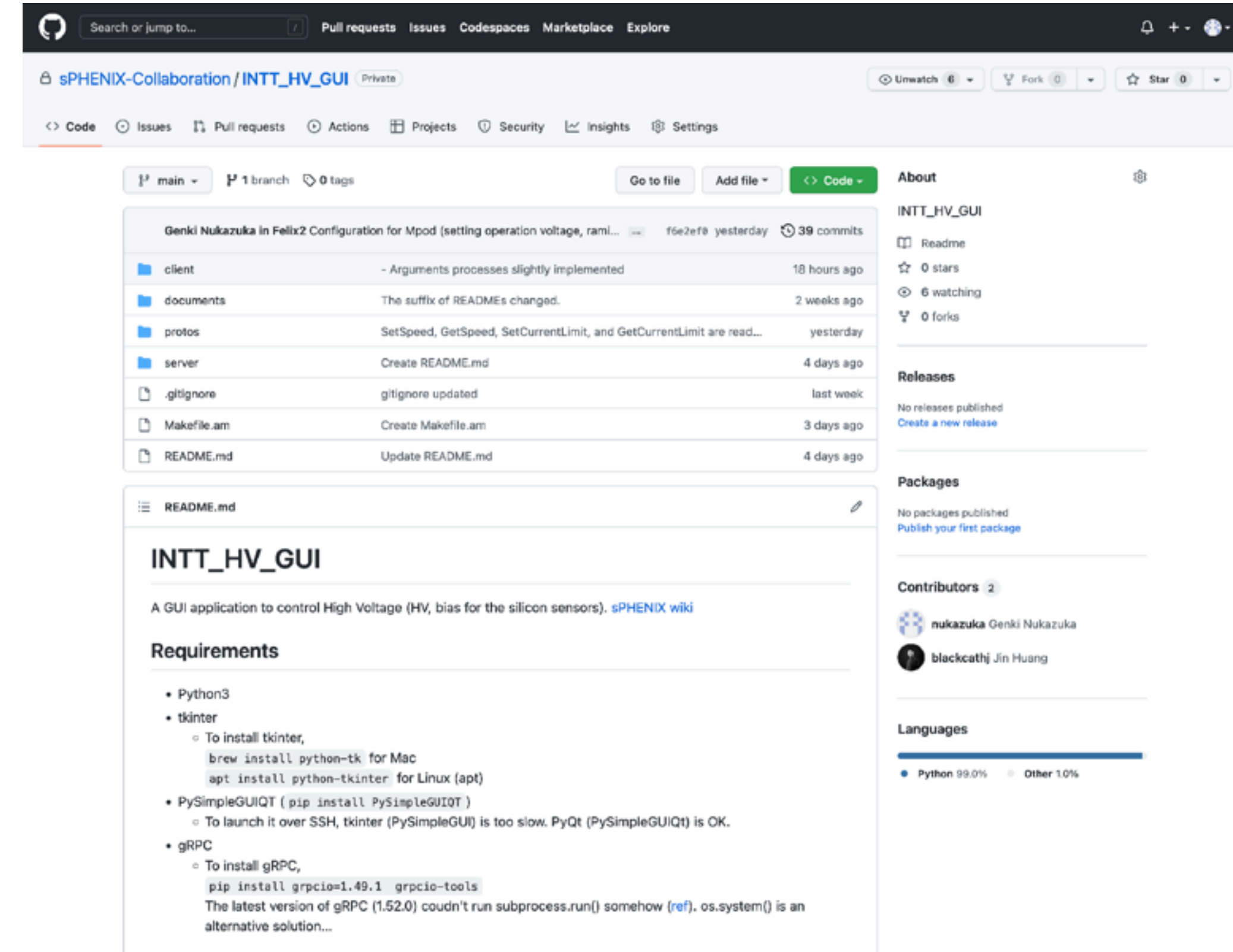
HV GUI : GitHub? BNL GitTea?

I made [a private repository](#) for the INTT HV app in GitHub under the INTT_developer team.

According to many people, even if it's private, crucial information, such as IP address, shouldn't be uploaded to GitHub.

→ not convenient

These can be loaded to GitTea by BNL...



The HV app: Status

- ☒ UI: ver1 made
- ☒ communication with MPOD: done
- ☒ Reading voltage: done
- ☒ Setting/Reading operation voltage: done
- ☒ Setting/Reading current limit:
- ☒ Turning ON/OFF: done
- ☒ Pilot operation at the silicon lab: ongoing
- ☐ Reading current: not yet
- ☐ Testing emergency flag: not yet
- ☐ Status indicator: not yet
- ☐ Monitoring voltage/current: partially done
- ☐ Making a database: not yet
- ☐ Connection to the database: not yet
- ☐ Monitoring tool: not yet