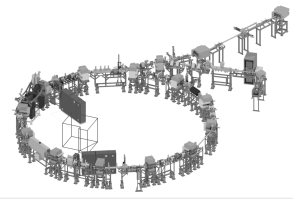


# CRYRING@ESR

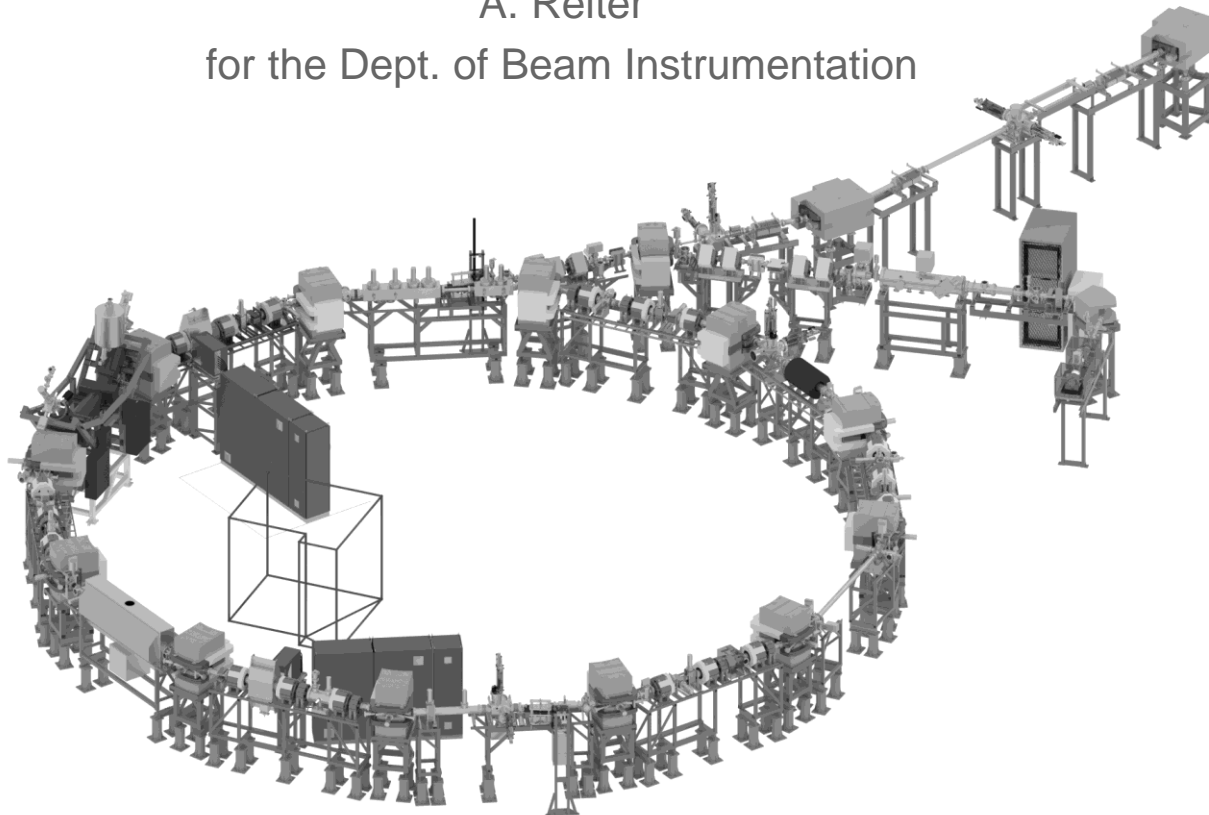


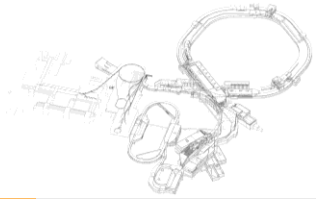
## CRYRING Beam Instrumentation

Basic Operational Aspects

A. Reiter

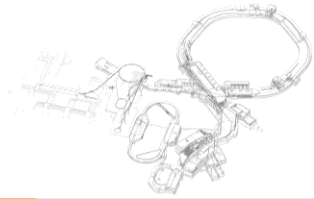
for the Dept. of Beam Instrumentation





# Content

- Timing Aspects: CRYRING@ESR schedule (March 2018)
- Linac Instrumentation Overview
- Instrumentation per device:
  - Source trafo YRT1DT1
  - CUPID for screens
  - Screen & Farady Cup dual-unit
  - Faraday Cup readout
  - RFQ iris (mostly obsolete!)
  - Pickups and energy measurement
  - Injection screens YRT1DF3 and YR01DF3



# Snoop tool – the Timing Sniffer

## Knowing what's going on



New timing events are characterised by more than one single number:  
 Timestamp, Group ID, Event Number, Sequence ID, Process ID, Chain ID

Filter

Accelerator: CRYRING

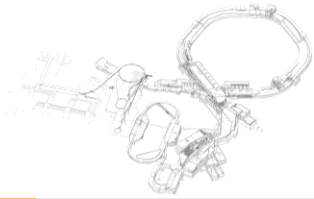
Eventfilter: Group: CRYRING\_RING Event#: Any Sequence: 0 Beam Process: 0

Stop at: Group: Ignore Event#: Ignore Sequence: 0 Beam Process: 0

Timestamp	Group ID	Event	Seq. Id	Proc. Id	Chain Id	Parameter	Flags
2017-10-09 09:16:50.778229544	[210] CRYRING_RING	CMD_BP_START [256]	1	1	1	0x0000040000000000	-D-
2017-10-09 09:16:51.797034755	[210] CRYRING_RING	CMD BUMPER_CHARGE [1...	1	1	1	0x0000040000000000	-D- (delayed by 1952141ns)
2017-10-09 09:16:51.797184755	[210] CRYRING_RING	CMD_BEAM_ON [518]	1	1	1	0x0000040000000000	-D- (delayed by 3035181ns)
2017-10-09 09:16:51.806229536	[210] CR						
2017-10-09 09:16:51.806229544	[210] CR						
2017-10-09 09:16:51.900229544	[210] CR						
2017-10-09 09:16:51.940229544	[210] CR						
2017-10-09 09:16:51.797034755	[210] CRYRING_RING	CMD BUMPER_CHARGE [1...	1	1	1		
2017-10-09 09:16:51.968229544	[210] CR						
2017-10-09 09:16:52.034229544	[210] CR						
2017-10-09 09:16:53.03034755	[210] CR						
2017-10-09 09:16:53.053184755	[210] CR						
2017-10-09 09:16:53.062229536	[210] CR						
2017-10-09 09:16:53.062229544	[210] CR						
2017-10-09 09:16:53.156229544	[210] CR						
2017-10-09 09:16:53.196229544	[210] CR						
2017-10-09 09:16:53.224229544	[210] CR						
2017-10-09 09:16:53.290229544	[210] CR						
2017-10-09 09:16:50.778229544	[210] CRYRING_RING	CMD_BP_START [256]	1	1	1		
2017-10-09 09:16:51.797034755	[210] CRYRING_RING	CMD BUMPER_CHARGE [1...	1	1	1		
2017-10-09 09:16:51.797184755	[210] CRYRING_RING	CMD_BEAM_ON [518]	1	1	1		
2017-10-09 09:16:51.806229536	[210] CRYRING_RING	CMD_BEAM_OFF [520]	1	1	1		
2017-10-09 09:16:51.806229544	[210] CRYRING_RING	CMD_BP_START [256]	1	7	1		
2017-10-09 09:16:51.900229544	[210] CRYRING_RING	EVT_NO_BEAM [137]	1	8	1		
2017-10-09 09:16:51.940229544	[210] CRYRING_RING	CMD_SEQ_START [257]	1	4	1		
2017-10-09 09:16:51.968229544	[210] CRYRING_RING	CMD_SYNCH [312]	1	4	1		
2017-10-09 09:16:52.034229544	[210] CRYRING_RING	CMD_BP_START [256]	1	1	1		
2017-10-09 09:16:53.03034755	[210] CRYRING_RING	CMD BUMPER_CHARGE [1...	1	1	1		

by H. Bräuning

- „Simple“ observer GUI connects to data master and dumps event list in tabular form
- Tool features filter options, screenshot, data export, ....
- Available via standard application launchers in control system



# CRYRING@ESR March 2018

## CRYRING – YRT1IN\_TO\_YRT1LQ1

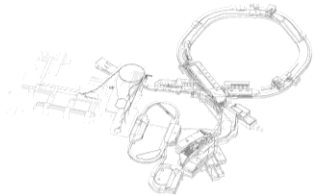


English 2018-03-23 22:06:22

Filter: Accelerator: **CRYRING**  
 Eventfilter: Group: **YRT1IN\_TO\_YRT1LQ1** Event#: **Any** Sequence: **0** Beam Process: **0**  
 Stop at: Group: **Ignore** Event#: **Ignore** Sequence: **0** Beam Process: **0**

Fmt	Timestamp	Group ID	Event	BeamIn	Seq. Id	Proc. Id	Reserved	Chain Id	Parameter	Flags
1	2018-03-23 21:06:36.518731336	[200] YRT1IN_TO_YRT1LQ1	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:36.602731336	[200] YRT1IN_TO_YRT1LQ1	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:36.731381336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_TRIGGER [280]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:36.731431336	[200] YRT1IN_TO_YRT1LQ1	CMD_SOURCE_START [273]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 199344ns)
1	2018-03-23 21:06:36.731631336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_MEAS1 [281]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 176112ns)
1	2018-03-23 21:06:36.733631336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_MEAS2 [282]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:36.733731336	[200] YRT1IN_TO_YRT1LQ1	CMD_SOURCE_STOP [274]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 460152ns)
1	2018-03-23 21:06:43.502731336	[200] YRT1IN_TO_YRT1LQ1	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:43.542731336	[200] YRT1IN_TO_YRT1LQ1	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:43.626731336	[200] YRT1IN_TO_YRT1LQ1	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:43.755381336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_TRIGGER [280]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:43.755431336	[200] YRT1IN_TO_YRT1LQ1	CMD_SOURCE_START [273]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 194056ns)
1	2018-03-23 21:06:43.755631336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_MEAS1 [281]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 121480ns)
1	2018-03-23 21:06:43.757631336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_MEAS2 [282]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:43.757731336	[200] YRT1IN_TO_YRT1LQ1	CMD_SOURCE_STOP [274]	true	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:50.526731336	[200] YRT1IN_TO_YRT1LQ1	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:50.566731336	[200] YRT1IN_TO_YRT1LQ1	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:50.650731336	[200] YRT1IN_TO_YRT1LQ1	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:50.779381336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_TRIGGER [280]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:50.779431336	[200] YRT1IN_TO_YRT1LQ1	CMD_SOURCE_START [273]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 224712ns)
1	2018-03-23 21:06:50.779631336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_MEAS1 [281]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 165032ns)
1	2018-03-23 21:06:50.781631336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_MEAS2 [282]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 568224ns)
1	2018-03-23 21:06:50.781731336	[200] YRT1IN_TO_YRT1LQ1	CMD_SOURCE_STOP [274]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 767080ns)
1	2018-03-23 21:06:57.550731336	[200] YRT1IN_TO_YRT1LQ1	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:57.590731336	[200] YRT1IN_TO_YRT1LQ1	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:57.674731336	[200] YRT1IN_TO_YRT1LQ1	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:57.803381336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_TRIGGER [280]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:57.803431336	[200] YRT1IN_TO_YRT1LQ1	CMD_SOURCE_START [273]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 207568ns)
1	2018-03-23 21:06:57.803631336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_MEAS1 [281]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 166880ns)
1	2018-03-23 21:06:57.805631336	[200] YRT1IN_TO_YRT1LQ1	CMD_BI_MEAS2 [282]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 207440ns)
1	2018-03-23 21:06:57.805731336	[200] YRT1IN_TO_YRT1LQ1	CMD_SOURCE_STOP [274]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 869312ns)

INFO [23 Mar 2018 22:05:24,193] (Screenshot.java) - Screenshot: [http://clipboard.acc.gsi.de/dav/bi/screenshots/wrsnoop/2018-03-23\\_22-05-23\\_asl740.acc.gsi.de\\_wrsnoop.png](http://clipboard.acc.gsi.de/dav/bi/screenshots/wrsnoop/2018-03-23_22-05-23_asl740.acc.gsi.de_wrsnoop.png)



# CRYRING@ESR March 2018

## CRYRING – YRT1LQ1\_TO\_YRT1LC1



Navigation icons: Home, Play, List, Save, Refresh, Info. Language: English. Date: 2018-03-23 22:07:27

▼ Filter

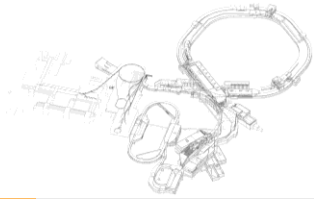
Accelerator: CRYRING

Eventfilter: Group: YRT1LQ1\_TO\_YRT1LC1 Event#: Any Sequence: 0 Beam Process: 0

Stop at: Group: Ignore Event#: Ignore Sequence: 0 Beam Process: 0

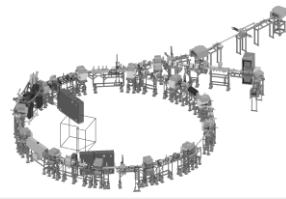
Fmt	Timestamp	Group ID	Event	BeamIn	Seq. Id	Proc. Id	Reserved	Chain Id	Parameter	Flags
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No content in table



# CRYRING@ESR March 2018

## CRYRING – YRT1LC1\_TO\_YRT1MH2

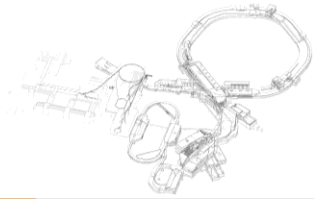


English
2018-03-23 22:06:47

Filter: Accelerator: **CRYRING**  
 Eventfilter: Group: **YRT1LC1\_TO\_YRT1MH2** Event#: **Any** Sequence: **0** Beam Process: **0**  
 Stop at: Group: **Ignore** Event#: **Ignore** Sequence: **0** Beam Process: **0**

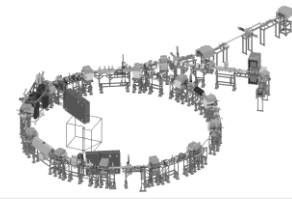
Fmt	Timestamp	Group ID	Event	BeamIn	Seq. Id	Proc. Id	Reserved	Chain Id	Parameter	Flags
1	2018-03-23 21:06:57.674731336	[202] YRT1LC1_TO_YRT1MH2	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:57.801113136	[202] YRT1LC1_TO_YRT1MH2	CMD_RF_PREP_PAUSE [291]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:57.803731336	[202] YRT1LC1_TO_YRT1MH2	CMD_RF_STOP_PAUSE [292]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 290336ns)
1	2018-03-23 21:06:57.804731336	[202] YRT1LC1_TO_YRT1MH2	CMD_RF_PREP [290]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:57.804981336	[202] YRT1LC1_TO_YRT1MH2	CMD_BI_TRIGGER [280]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:57.805231336	[202] YRT1LC1_TO_YRT1MH2	CMD_BEAM_ON [518]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:06:57.805232336	[202] YRT1LC1_TO_YRT1MH2	CMD_BI_MEAS1 [281]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 171520ns)
1	2018-03-23 21:06:57.805682336	[202] YRT1LC1_TO_YRT1MH2	CMD_BI_MEAS2 [282]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 688328ns)
1	2018-03-23 21:06:57.805731336	[202] YRT1LC1_TO_YRT1MH2	CMD_BEAM_OFF [520]	true	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:11.598731336	[202] YRT1LC1_TO_YRT1MH2	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:11.638731336	[202] YRT1LC1_TO_YRT1MH2	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:11.722731336	[202] YRT1LC1_TO_YRT1MH2	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:11.849131336	[202] YRT1LC1_TO_YRT1MH2	CMD_RF_PREP_PAUSE [291]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:07:11.851731336	[202] YRT1LC1_TO_YRT1MH2	CMD_RF_STOP_PAUSE [292]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 308984ns)
1	2018-03-23 21:07:11.852731336	[202] YRT1LC1_TO_YRT1MH2	CMD_RF_PREP [290]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:07:11.852981336	[202] YRT1LC1_TO_YRT1MH2	CMD_BI_TRIGGER [280]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:07:11.853231336	[202] YRT1LC1_TO_YRT1MH2	CMD_BEAM_ON [518]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:07:11.853232336	[202] YRT1LC1_TO_YRT1MH2	CMD_BI_MEAS1 [281]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 153112ns)
1	2018-03-23 21:07:11.853682336	[202] YRT1LC1_TO_YRT1MH2	CMD_BI_MEAS2 [282]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 322768ns)
1	2018-03-23 21:07:11.853731336	[202] YRT1LC1_TO_YRT1MH2	CMD_BEAM_OFF [520]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 393576ns)
1	2018-03-23 21:07:18.622731336	[202] YRT1LC1_TO_YRT1MH2	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:18.662731336	[202] YRT1LC1_TO_YRT1MH2	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:18.746731336	[202] YRT1LC1_TO_YRT1MH2	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:18.873131336	[202] YRT1LC1_TO_YRT1MH2	CMD_RF_PREP_PAUSE [291]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:07:18.875731336	[202] YRT1LC1_TO_YRT1MH2	CMD_RF_STOP_PAUSE [292]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 222856ns)
1	2018-03-23 21:07:18.876731336	[202] YRT1LC1_TO_YRT1MH2	CMD_RF_PREP [290]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:07:18.876981336	[202] YRT1LC1_TO_YRT1MH2	CMD_BI_TRIGGER [280]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:07:18.877231336	[202] YRT1LC1_TO_YRT1MH2	CMD_BEAM_ON [518]	true	1	1	0x40	1	0x0000040000000000	---
1	2018-03-23 21:07:18.877232336	[202] YRT1LC1_TO_YRT1MH2	CMD_BI_MEAS1 [281]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 178072ns)
1	2018-03-23 21:07:18.877682336	[202] YRT1LC1_TO_YRT1MH2	CMD_BI_MEAS2 [282]	true	1	1	0x40	1	0x0000040000000000	-D- (delayed by 507920ns)
1	2018-03-23 21:07:18.877731336	[202] YRT1LC1_TO_YRT1MH2	CMD_BEAM_OFF [520]	true	1	1	0x40	1	0x0000040000000000	C--

INFO [23 Mar 2018 22:06:25.154] (Screenshot.java) - Screenshot: [http://clipboard.acc.gsi.de/dav/bi/screenshots/wrsnoop/2018-03-23\\_22-06-24\\_asl740.acc.gsi.de\\_wrsnoop.png](http://clipboard.acc.gsi.de/dav/bi/screenshots/wrsnoop/2018-03-23_22-06-24_asl740.acc.gsi.de_wrsnoop.png)



# CRYRING@ESR March 2018

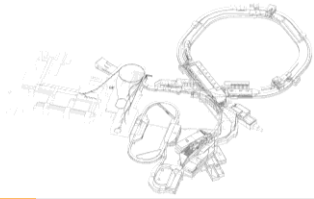
## CRYRING – YRT1MH2\_TO\_CRYRING



English 2018-03-23 22:07:13

Filter: Accelerator: 
 Eventfilter: Group:  Event#:  Sequence:  Beam Process: 
 Stop at: Group:  Event#:  Sequence:  Beam Process:

Fmt	Timestamp	Group ID	Event	BeamIn	Seq. Id	Proc. Id	Reserved	Chain Id	Parameter	Flags
1	2018-03-23 21:06:50.526731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:50.566731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:06:50.650731336	[203] YRT1MH2_TO_CRYRING	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:06:50.763231336	[203] YRT1MH2_TO_CRYRING	CMD_SEPTUM_CHARGE [521]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:06:57.550731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:06:57.590731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:06:57.674731336	[203] YRT1MH2_TO_CRYRING	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:06:57.787231336	[203] YRT1MH2_TO_CRYRING	CMD_SEPTUM_CHARGE [521]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:11.598731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:11.638731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:11.722731336	[203] YRT1MH2_TO_CRYRING	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:11.835231336	[203] YRT1MH2_TO_CRYRING	CMD_SEPTUM_CHARGE [521]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:18.622731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:18.662731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:18.746731336	[203] YRT1MH2_TO_CRYRING	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:18.859231336	[203] YRT1MH2_TO_CRYRING	CMD_SEPTUM_CHARGE [521]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:32.670731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:32.710731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:32.794731336	[203] YRT1MH2_TO_CRYRING	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:32.907231336	[203] YRT1MH2_TO_CRYRING	CMD_SEPTUM_CHARGE [521]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:39.694731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:39.734731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:39.818731336	[203] YRT1MH2_TO_CRYRING	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:39.931231336	[203] YRT1MH2_TO_CRYRING	CMD_SEPTUM_CHARGE [521]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:46.718731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_START [258]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:46.758731336	[203] YRT1MH2_TO_CRYRING	CMD_GAP_END [259]	false	1	1	0x40	1	0x0000040000000000	C--
1	2018-03-23 21:07:46.842731336	[203] YRT1MH2_TO_CRYRING	CMD_SEQ_START [257]	true	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:07:46.955231336	[203] YRT1MH2_TO_CRYRING	CMD_SEPTUM_CHARGE [521]	true	1	1	0x40	1	0x0000040000000000	----



# CRYRING@ESR March 2018

## CRYRING – CRYRING\_RING



Filter

Accelerator: CRYRING

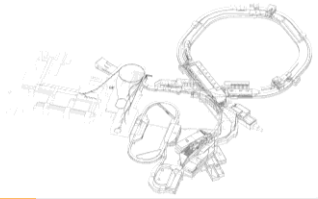
Eventfilter: Group: CRYRING\_RING Event#: Any Sequence: 0 Beam Process: 0

Stop at: Group: Ignore Event#: Ignore Sequence: 0 Beam Process: 0

Fmt	Timestamp	Group ID	Event	BeamIn	Seq. Id	Proc. Id	Reserved	Chain Id	Parameter	Flags
1	2018-03-23 21:03:05.758731336	[210] CRYRING_RING	CMD_GAP_START [258]	false	1	5	0x140	1	0x0000040000000000	----
1	2018-03-23 21:03:05.798731336	[210] CRYRING_RING	CMD_GAP_END [259]	false	1	5	0x140	1	0x0000040000000000	C--
1	2018-03-23 21:03:05.818731336	[210] CRYRING_RING	CMD_SEQ_START [257]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:03:05.846731336	[210] CRYRING_RING	CMD_SYNCH [312]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:03:05.882731336	[210] CRYRING_RING	CMD_BP_START [256]	true	1	2	0x80	1	0x0000040000000000	C--
1	2018-03-23 21:03:06.001187315	[210] CRYRING_RING	CMD BUMPER_CHARGE [1...	true	1	2	0x80	1	0x0000040000000000	-D- (delayed by 255301ns)
1	2018-03-23 21:03:06.013258315	[210] CRYRING_RING	CMD_BEAM_ON [518]	true	1	2	0x80	1	0x0000040000000000	-D- (delayed by 422525ns)
1	2018-03-23 21:03:06.020731336	[210] CRYRING_RING	CMD_BP_START [256]	true	1	3	0xC0	1	0x0000040000000000	----
1	2018-03-23 21:03:06.198731336	[210] CRYRING_RING	CMD_BP_START [256]	true	1	4	0x100	1	0x0000040000000000	-D- (delayed by 266096ns)
1	2018-03-23 21:03:12.272731328	[210] CRYRING_RING	CMD_BEAM_OFF [520]	true	1	4	0x100	1	0x0000040000000000	----
1	2018-03-23 21:03:12.272731336	[210] CRYRING_RING	CMD_BP_START [256]	false	1	5	0x140	1	0x0000040000000000	-D- (delayed by 263016ns)
1	2018-03-23 21:03:12.782731336	[210] CRYRING_RING	CMD_GAP_START [258]	false	1	5	0x140	1	0x0000040000000000	----
1	2018-03-23 21:03:12.822731336	[210] CRYRING_RING	CMD_GAP_END [259]	false	1	5	0x140	1	0x0000040000000000	----
1	2018-03-23 21:03:12.842731336	[210] CRYRING_RING	CMD_SEQ_START [257]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:03:12.870731336	[210] CRYRING_RING	CMD_SYNCH [312]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:03:12.906731336	[210] CRYRING_RING	CMD_BP_START [256]	true	1	2	0x80	1	0x0000040000000000	C--
1	2018-03-23 21:03:13.025187315	[210] CRYRING_RING	CMD BUMPER_CHARGE [1...	true	1	2	0x80	1	0x0000040000000000	-D- (delayed by 255213ns)
1	2018-03-23 21:03:13.037258315	[210] CRYRING_RING	CMD_BEAM_ON [518]	true	1	2	0x80	1	0x0000040000000000	-D- (delayed by 189397ns)
1	2018-03-23 21:03:13.044731336	[210] CRYRING_RING	CMD_BP_START [256]	true	1	3	0xC0	1	0x0000040000000000	----
1	2018-03-23 21:03:13.222731336	[210] CRYRING_RING	CMD_BP_START [256]	true	1	4	0x100	1	0x0000040000000000	-D- (delayed by 263112ns)
1	2018-03-23 21:03:19.296731328	[210] CRYRING_RING	CMD_BEAM_OFF [520]	true	1	4	0x100	1	0x0000040000000000	----
1	2018-03-23 21:03:19.296731336	[210] CRYRING_RING	CMD_BP_START [256]	false	1	5	0x140	1	0x0000040000000000	-D- (delayed by 433936ns)
1	2018-03-23 21:03:19.806731336	[210] CRYRING_RING	CMD_GAP_START [258]	false	1	5	0x140	1	0x0000040000000000	C--
1	2018-03-23 21:03:19.846731336	[210] CRYRING_RING	CMD_GAP_END [259]	false	1	5	0x140	1	0x0000040000000000	----
1	2018-03-23 21:03:19.866731336	[210] CRYRING_RING	CMD_SEQ_START [257]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:03:19.894731336	[210] CRYRING_RING	CMD_SYNCH [312]	false	1	1	0x40	1	0x0000040000000000	----
1	2018-03-23 21:03:19.930731336	[210] CRYRING_RING	CMD_BP_START [256]	true	1	2	0x80	1	0x0000040000000000	C--
1	2018-03-23 21:03:20.049187315	[210] CRYRING_RING	CMD BUMPER_CHARGE [1...	true	1	2	0x80	1	0x0000040000000000	-D- (delayed by 249309ns)
1	2018-03-23 21:03:20.061258315	[210] CRYRING_RING	CMD_BEAM_ON [518]	true	1	2	0x80	1	0x0000040000000000	-D- (delayed by 382749ns)
1	2018-03-23 21:03:20.068731336	[210] CRYRING_RING	CMD_BP_START [256]	true	1	3	0xC0	1	0x0000040000000000	----
1	2018-03-23 21:03:20.246731336	[210] CRYRING_RING	CMD_BP_START [256]	true	1	4	0x100	1	0x0000040000000000	-D- (delayed by 226304ns)

INFO [23 Mar 2018 22:00:56.062] (ClientConnection.java) - connection tcp://sddsc037:13455/0: connected to 'tcp://sddsc037:13455/0'





# CRYRING

## Event Structure (examples)

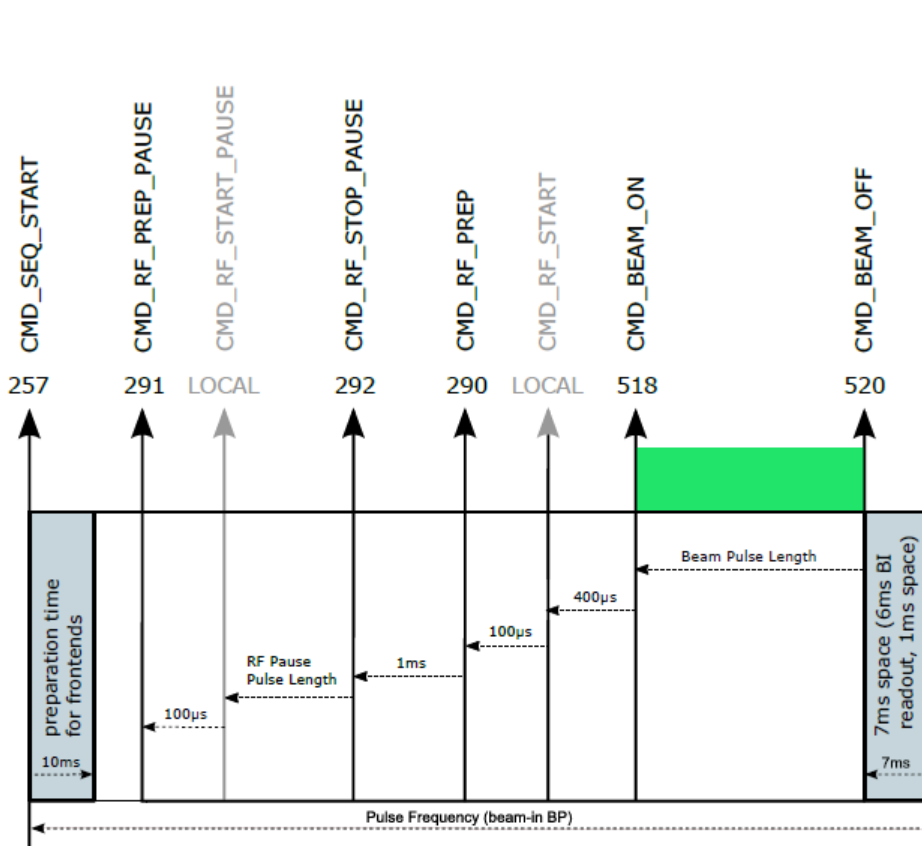


Figure 3: Event structure for YRME (beam-in)

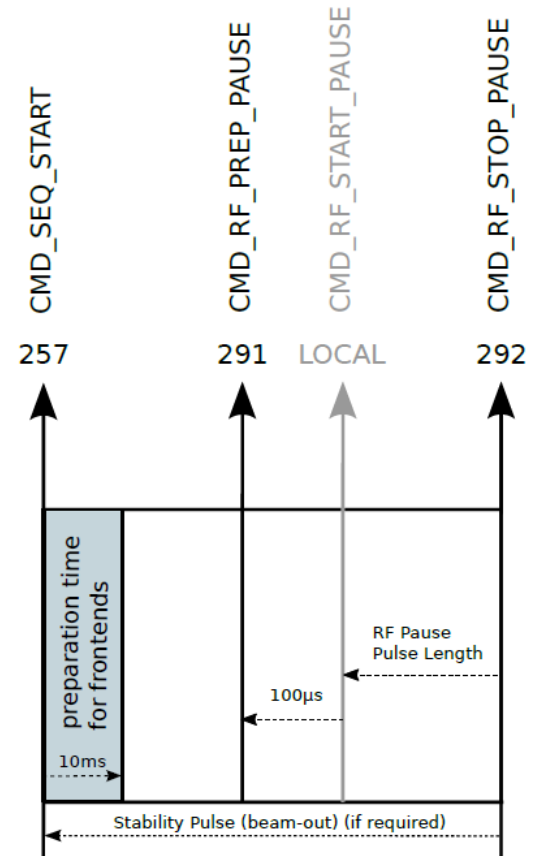
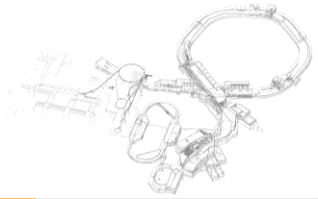
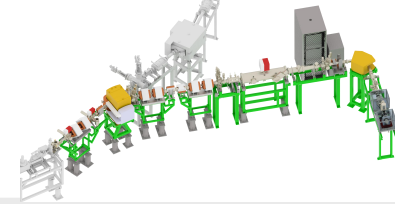


Figure 4: Event structure for YRME (beam-out)

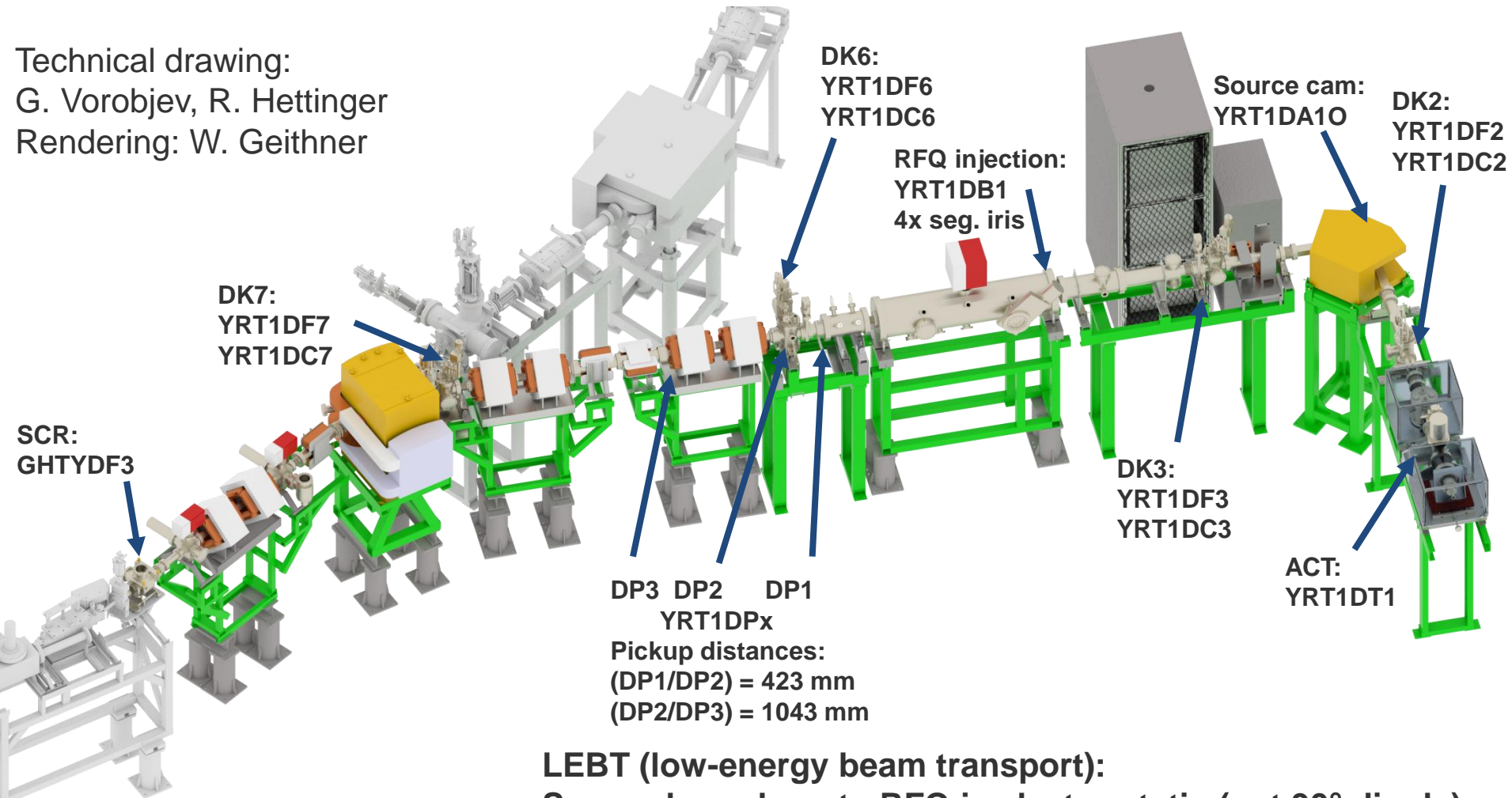
The timing schedules and groups are summarised in a dedicated document „CRYRING Event Structure“ by N.N. (?????)



# Overview Linac Instrumentation



Technical drawing:  
G. Vorobjev, R. Hettinger  
Rendering: W. Geithner

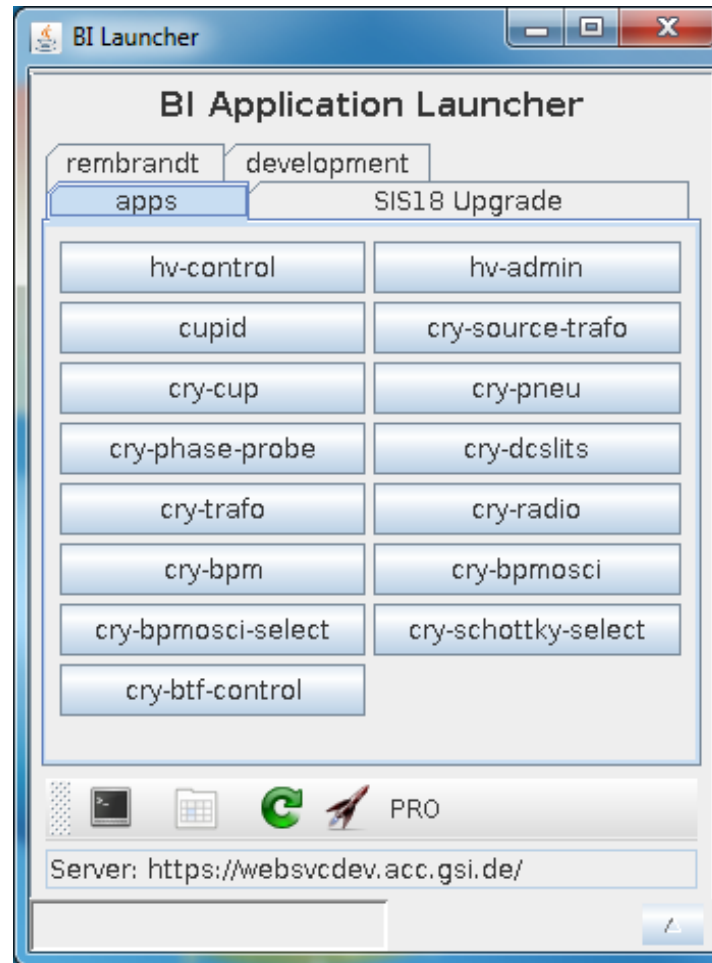


**LEBT (low-energy beam transport):**  
**Source branch up to RFQ is electro-static (not 90° dipole)**  
**Source – ACT – Chopper**

# Starting BI Expert Applications via BI-Launcher



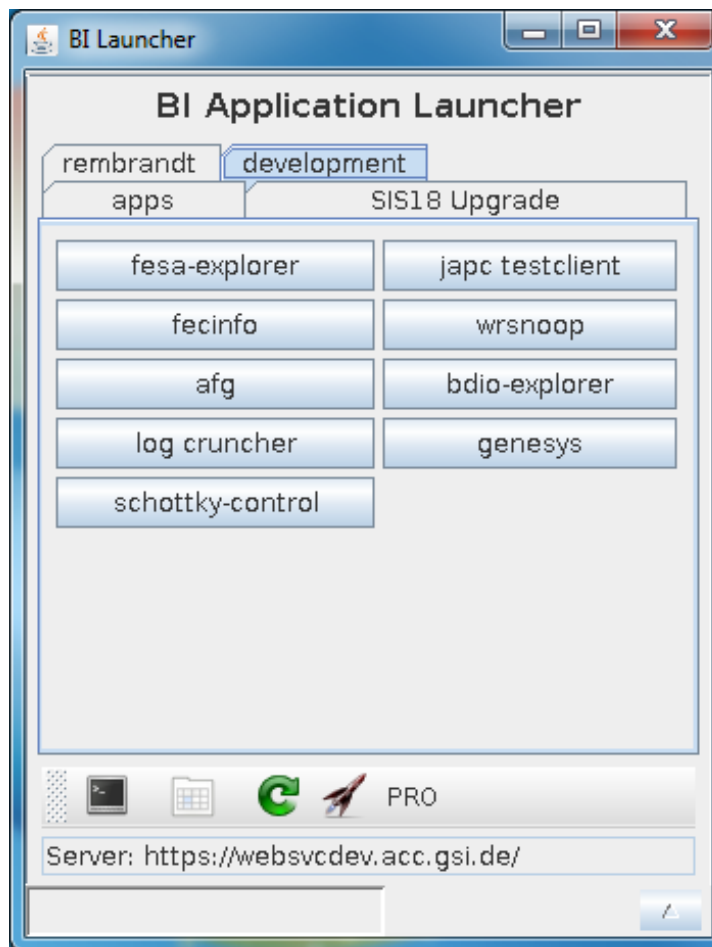
Hochspannung  
Leuchtschirme  
Faraday Cups  
Linac TOF Messung  
Ring Intensitätsmessung  
Ring BPMs  
Anwahl BPM für Oszi  
BTF Signalanwahl



Don't use!  
ACT Quelle  
(Pressluftantriebe)  
Auslese RFQ Blenden  
Ring CryRadio Intensität  
BPM Spuren auf Oszi  
Schottky ( $\Delta X$ ,  $\Delta Y$ ,  $\Delta Q$ ,  $\Sigma$ )

Stepper motor and pneumatic drives can be controlled from [DeciveControl \(by CSCO\)](#).

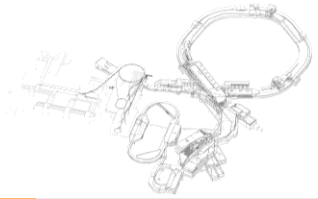
# Starting BI Expert Applications via BI-Launcher



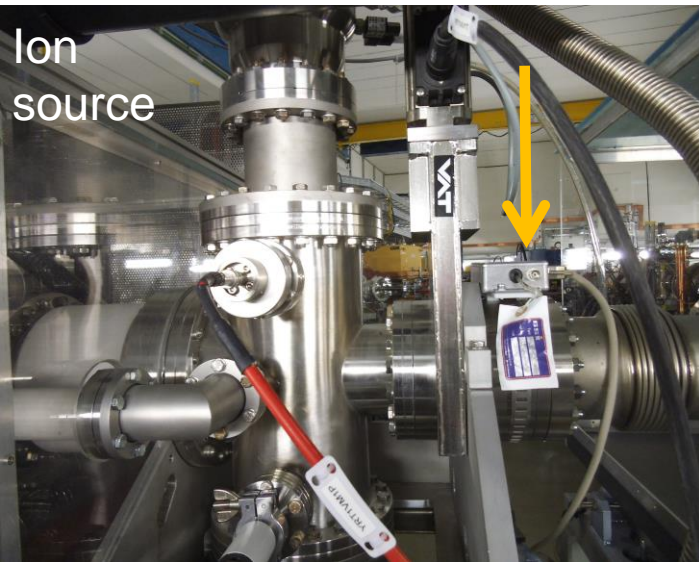
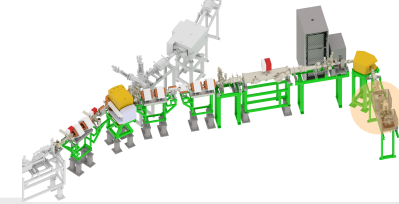
FESA Explorer  
(direct connection for experts!)

Snoop Tool  
TDF file reader  
Genesys FTRN  
configurator

TDF files are binary data files saved by BI DAQ systems

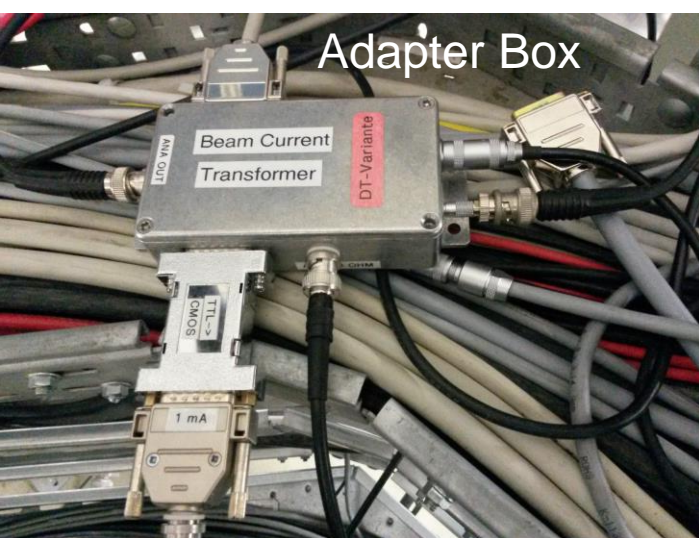


# Ion Source Transformer YRT1DT1

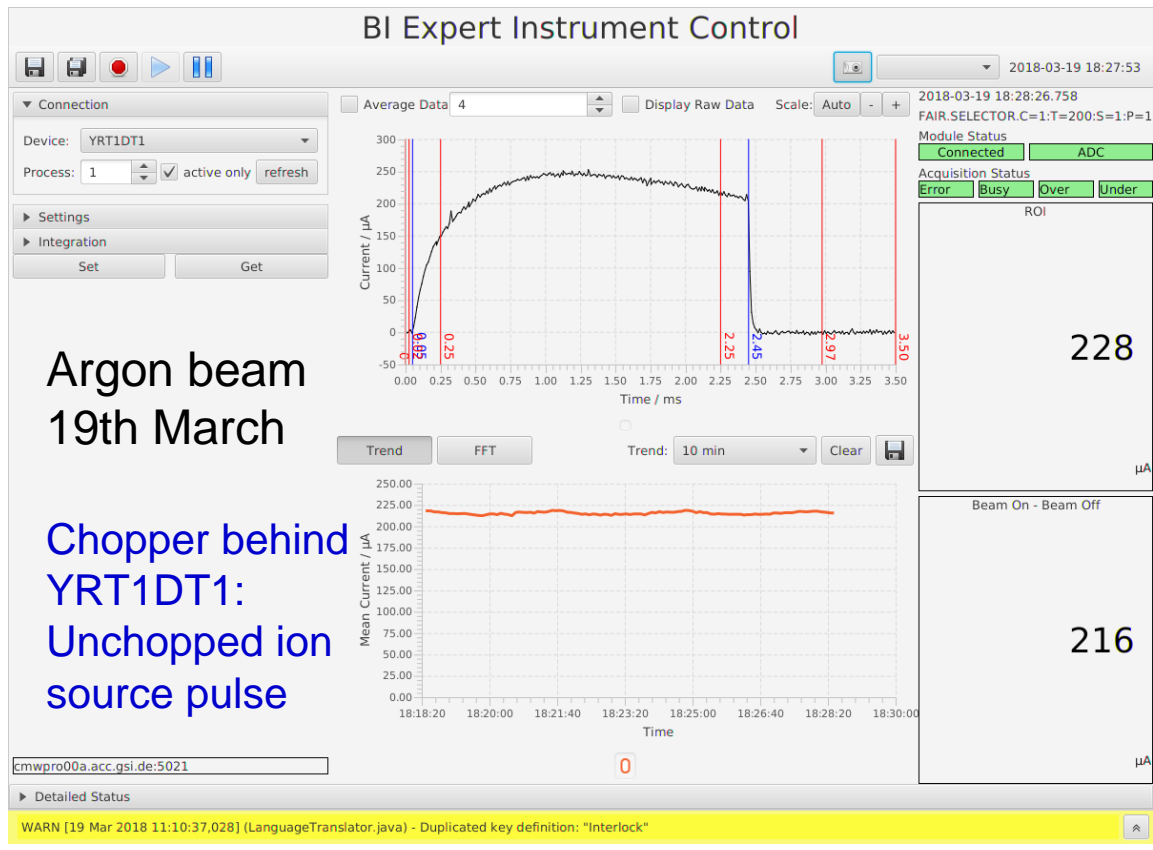


Ion source

- Hardware: GSI-type AC current transformer UNI-DT 1030
  - Timing controlled by DAQ system
  - Amplifier output adapted to 50 Ohm ADC input (10 MSa/s)
  - Single, 1mA fixed-gain sufficient for operation (at the moment)
- Software: cry-source-trafo

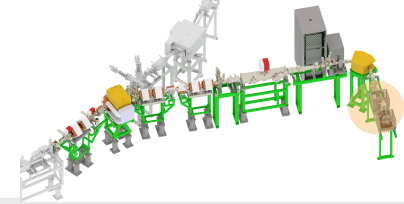
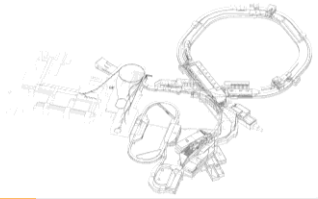


Adapter Box



Argon beam  
19th March

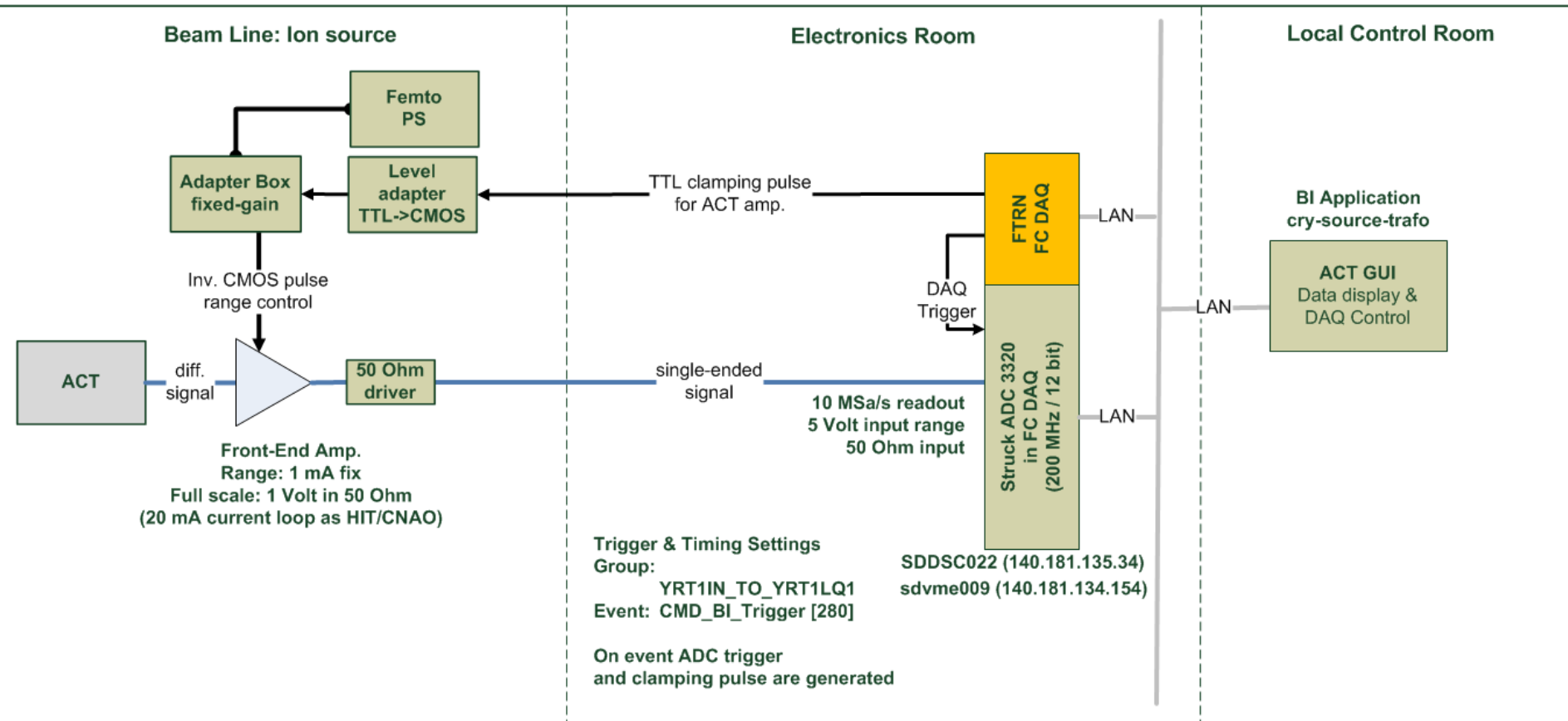
Chopper behind  
YRT1DT1:  
Unchopped ion  
source pulse

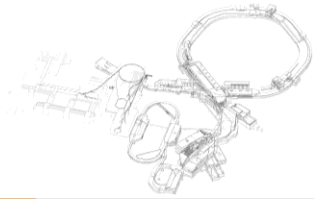


# Hardware Scheme YRT1DT1

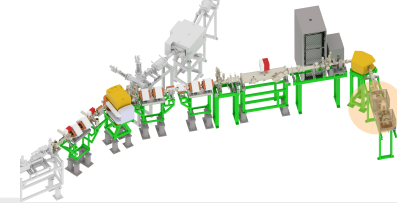
## CRYRING Injector Linac Schematic of AC Transformer Electronics & DAQ

A. Reiter  
26th March 2018





# Expert GUI application cry-source-trafo



### BI Expert Instrument Control

2018-03-19 18:27:53

2018-03-19 18:28:26.758  
FAIR.SELECTOR.C=1:T=200:S=1:P=1

Module Status  
Connected ADC

Acquisition Status  
Error Busy Over Under

Connection  
Device: YRT1DT1  
Process: 1 active only refresh

Settings  
Integration  
Set Get

Average Data 4 Display Raw Data Scale: Auto - +

Current /  $\mu\text{A}$

Time / ms

Trend FFT Trend: 10 min Clear

Mean Current /  $\mu\text{A}$

Time

ROI

228  $\mu\text{A}$

Beam On - Beam Off

216  $\mu\text{A}$

cmwpro00a.acc.gsi.de:5021

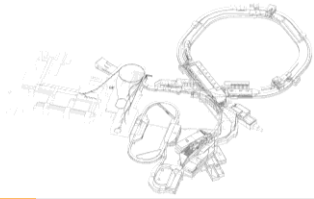
Detailed Status

WARN [19 Mar 2018 11:10:37,028] (LanguageTranslator.java) - Duplicated key definition: "Interlock"

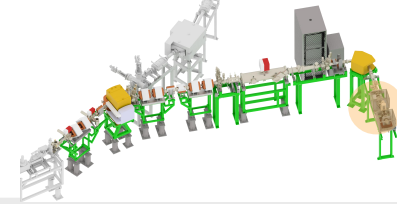
Blue markers:  
beam ON to beam OFF

Inner red markers: ROI

Outer markers: Baseline



# Expert GUI application cry-source-trafo

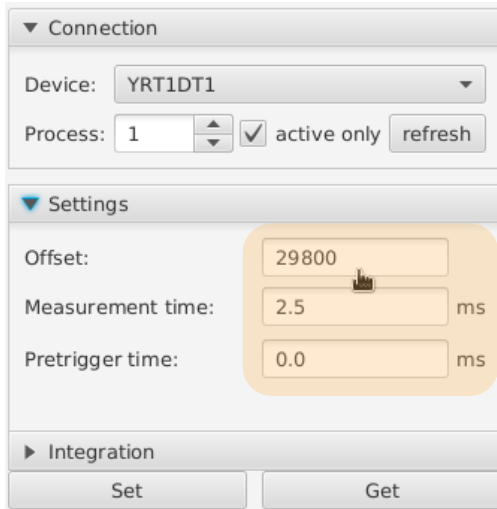


## Standard settings

Save data      Stop data export      Start/Stop GUI update

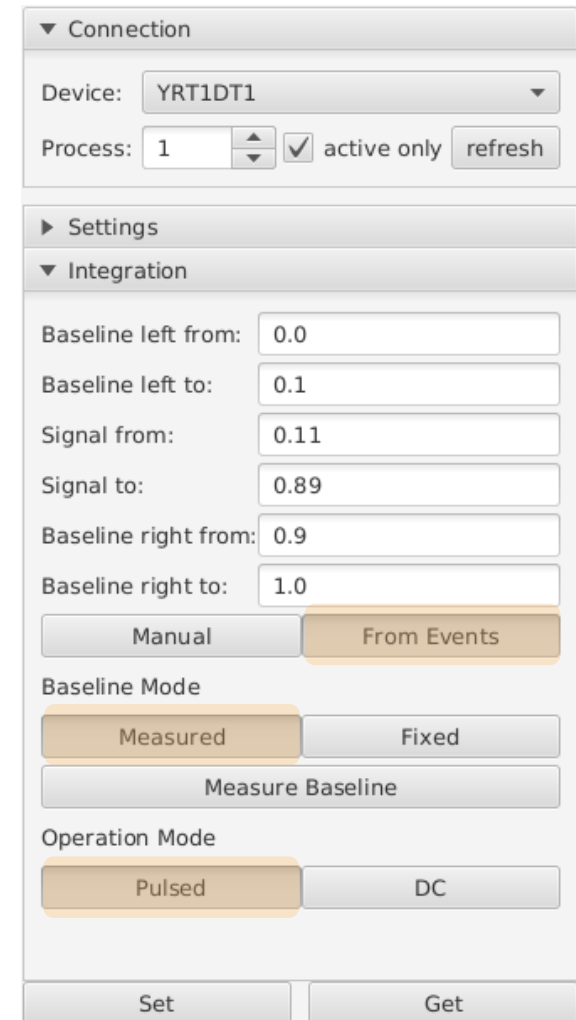


Storage area: <http://clipboard.acc.gsi.de/bi/data/YRT1DT1/>  
Screenshots: <http://clipboard.acc.gsi.de/bi/screenshots/YRT1DT1/>

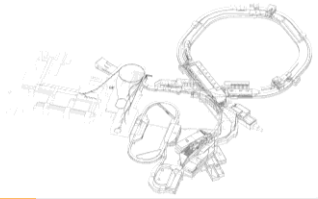


**ADC baseline! Do not touch!**

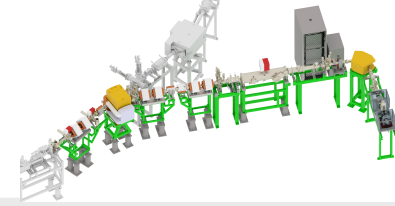
Get: Read information from DAQ system  
Set: Send new values to DAQ system







# Scintillating Screens Expert GUI application CUPID



Readout with digital camera system CUPID

LED control for YRT1 cameras to be implemented!!!

Different screens are used:

- YAG
- Cromox
- P43

4 diagnostic chambers

YRT1DK2

YRT1DK3 (YAG)

YRT1DK6 (P43)

YRT1DK7 (P43)

and

SourceCam

YRT1DA10 which

looks into the ion source chamber

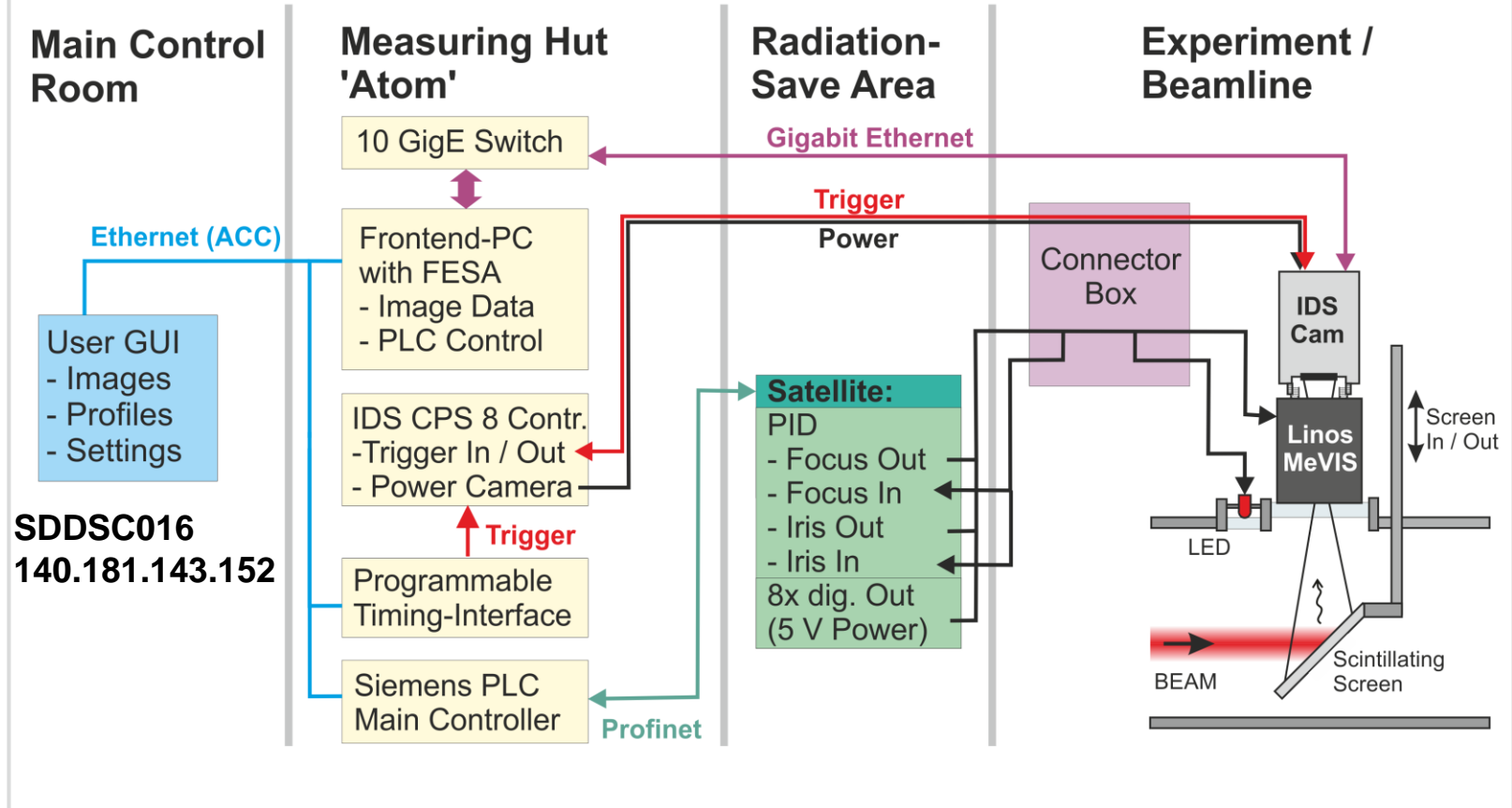
The screenshot shows the CUPID GUI for YRT1DF6V. It features a top navigation bar with camera selection buttons (YRT1DA10, YRT1DF2V, YRT1DF3V, YRT1DF6V, YRT1DF7V, YR01DF3V, YR07DF2V, YR11DF3V) and a 'Timing' button. The main interface is divided into several panels:

- Camera Control:** Includes 'Stop', 'Reset', and 'Stop All' buttons, and an 'Acquire image' checkbox.
- Acquisition Settings:** Includes 'Freeze' button, 'Acquisition mode' (triggered), 'Binning' (1), 'Analog gain boost (2x)', 'Exposure time [s]' (0.05), and 'Frame rate [fps]' (4).
- Display Settings:** Includes 'Mode' (Linear), 'Brightness' slider, 'Zoom' (1x, 2x, 4x), and 'Fit' (1x, 2x, 3x).
- Info Panel:** Shows 'Cyclename: FAIR.SELECTOR.ALL', 'Acq Time: 2017-07-14 19:22:00.418', 'Integral: 8462695', and various profile statistics (Max Pos, Center, FWHM).
- Profiles = Hor/Ver projections:** Two line graphs showing 'Average Intensity' vs 'X Position / mm' and 'Y Position / mm'. Both show a bell-shaped curve centered at 0.
- Camera Image:** A large black area with a green grid and a central bright spot. A marker is visible at the bottom: 'Marker: x = 2.0 mm ( 54 px) y = 1.5 mm ( 42 px) value = 99'.
- Histogram of pixel brightness:** A log-linear plot of 'Counts' vs 'Brightness' showing a distribution that decays as brightness increases.

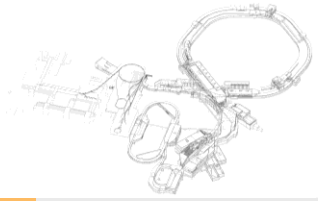
Histogram of pixel brightness  
-> Use for adjustment of exposure time

# Hardware Scheme FAIR screens YR07DF2, YR11DF3, GHTB/GHTY

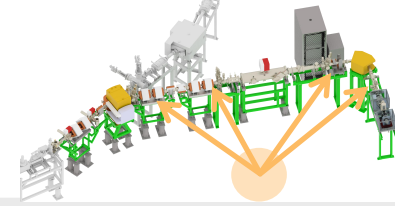
## HTA & Cave A Communication Scheme



**Screens in YRT1, GHTYDF3, YR01DF3, YRE1DF1 do not have a controllable iris, but do have an LED (control to be implemented in GUI)!**



# Hardware Scheme LED Control via browser



<https://sdadev081.acc.gsi.de:8082/ui/>

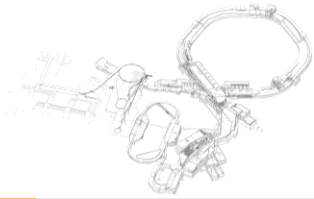
user: u....; pwd=

**LED control to be implemented  
in CUPID GUI**

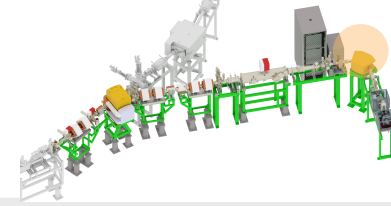
Select „LED CRYRING“ from menu

The screenshot shows a web browser window with the URL <https://sdadev081.acc.gsi.de:8082/ui/#/2>. The browser's address bar contains the text "femto dhpca-100". The browser's toolbar shows various icons and a search bar. The main content area of the browser displays a dark grey header with a hamburger menu icon and the text "LED CRYRING". Below the header, there are six control panels arranged in two rows of three. Each panel has a title, a "Set LED" button with a toggle switch, and a status indicator. The status indicators are "LED" in blue and "OFF" in red. The panels are labeled as follows:

Panel ID	Set LED	Status
GHTYDF3	<input type="checkbox"/>	LED OFF
YR01DF3	<input type="checkbox"/>	LED OFF
YRT1DF7	<input type="checkbox"/>	LED OFF
YRT1DF6	<input type="checkbox"/>	LED OFF
YRT1DF3	<input type="checkbox"/>	LED OFF
YRT1DF2	<input type="checkbox"/>	LED OFF

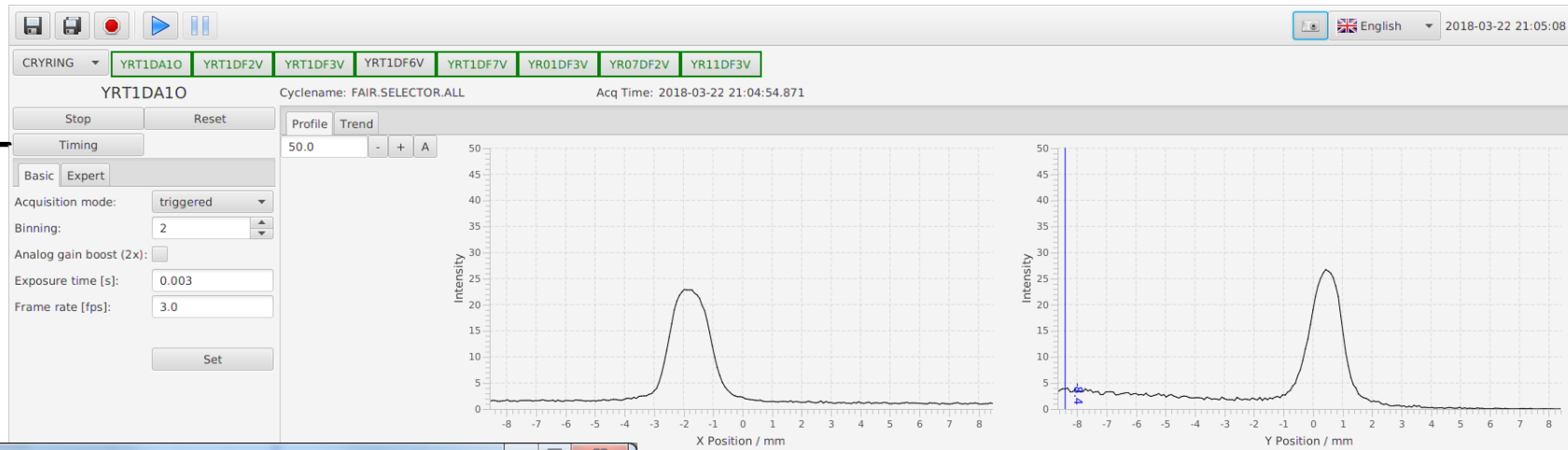


# SourceCam YRT1DA10V View into ion source

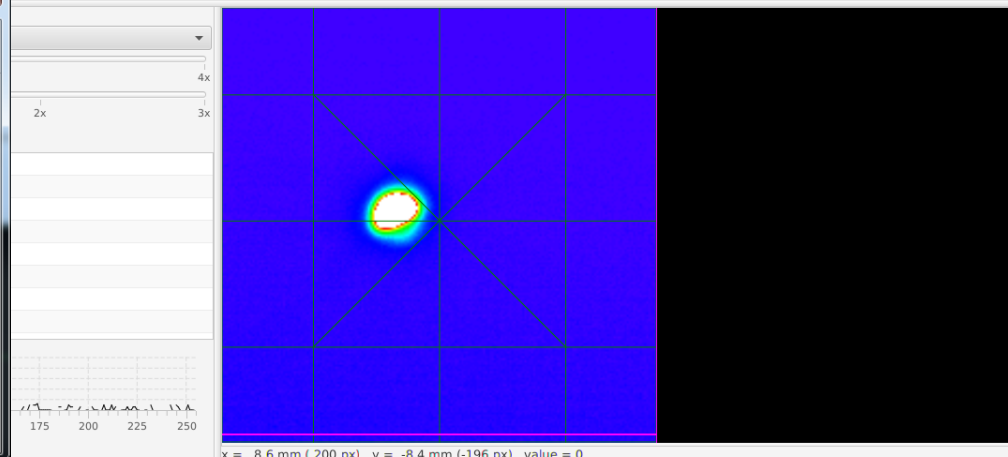


Screenshot shows discharge in ion source during Mg operation.  
In other circumstances the glow around the filament can be observed.

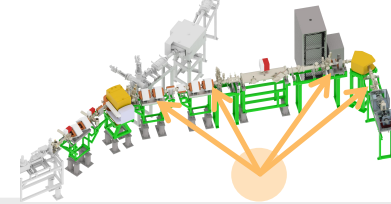
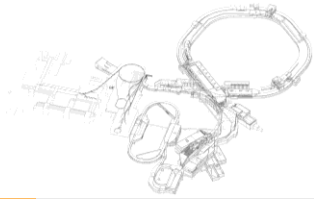
Timing



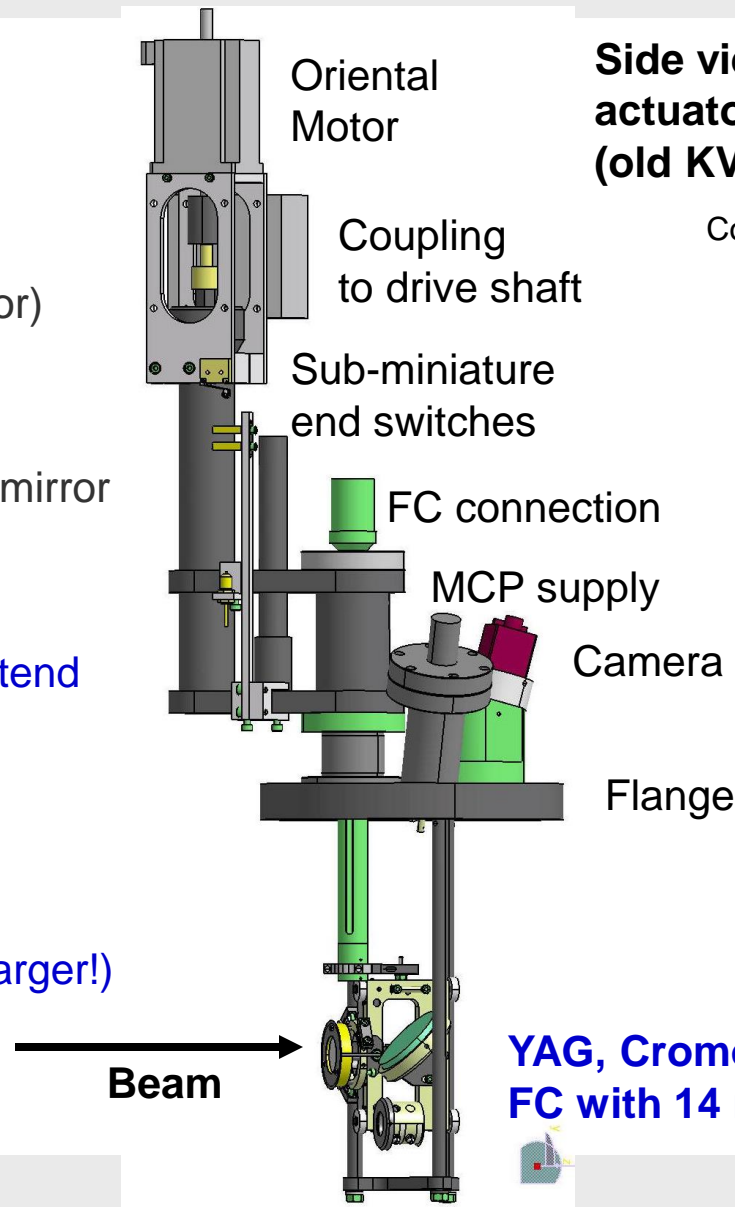
The 'Global Trigger' dialog box is open. It has a title bar with 'Global Trigger' and standard window controls. The 'Affected Devices' list includes YRT1DA10, YRT1DF2V, YRT1DF3V, YRT1DF6V, YRT1DF7V, YR01DF3V, YR07DF2V, and YR11DF3V. The 'Trigger Settings' section shows 'Trigger Event: CMD\_BI\_TRIGGER', 'Trigger Delay [ns]: 0', and two checkboxes for 'Trigger Sequence Id' and 'Trigger Beam Process Id', both set to 0 and 'active only'. There are 'refresh' buttons next to the 0 values. At the bottom are 'Cancel' and 'OK' buttons.



# Profile & Current Measurements Dual Diagnostics Box



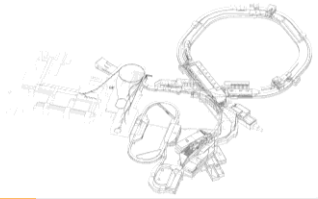
- Used at HITRAP
- Stepper Motor Drive**
  - 100 mm length
  - Modification to FAIR standard (potentiometer, connectors, motor)
  - Application: [DeviceControl](#)
- Profile measurement**
  - Screen: Cromox, YAG or P43 & mirror
  - Digital Camera
  - Test LED, but no iris control
  - Use short chopper window to extend lifetime of screen materials!
- Current measurement**
  - Faraday Cup
  - Repeller electrode
  - 14 mm diameter (beam spot is larger!)
  - Femto amplifier DHPA-100



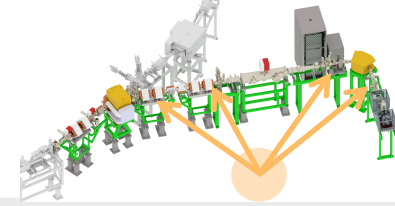
**Side view of  
actuator and detectors  
(old KVI version)**

Courtesy of G. Vorobjev

**YAG, Cromox, P43 & Mirror  
FC with 14 mm  $\varnothing$**



# Current Measurement Expert GUI application CryCup



Flight time causes small offset wrt. blue Beam ON/OFF markers

Gain and bandwidth are coupled -> see next slide

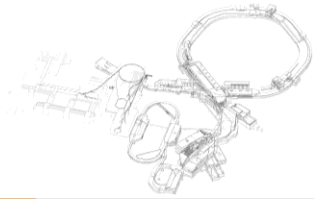
**Expert**

Bandwidth: 1, 10 MHz, full  
typ. setting: 1 MHz

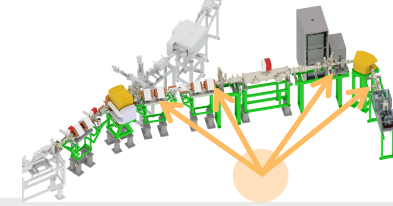
The screenshot shows the CryCup GUI interface. On the left, the 'Expert' tab is active, displaying settings for Device (YR02DC1), Beam Selector (1), Amplifier Gain (10^5), and various measurement parameters. The main display area shows two plots: a top plot of current (µA) vs. time (ms) with a blue signal and vertical markers, and a bottom plot of current (µA) vs. time (ms) showing a detailed view of the signal with a legend for 'YR1D06 [Beam On/Off]' and 'YR1D06 [ROI]'. The right sidebar shows hardware and acquisition status, including Mean Current (1.88 µA) and Max. Current (2.98 µA). The bottom status bar shows system information and a log of messages.

Select amplifier gain for selected FC and update settings with „Set“ button

11:29:34 - INFO [23 Mar 2018 10:29:34,725] (@apcConnection.java) - Set property ExpertSetting



# Current Measurement Parameters of Femto amplifier

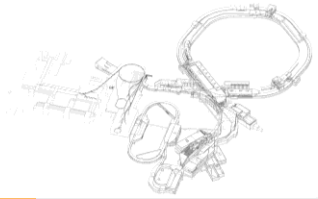


Choice of gain results in settings indicated by the shaded area.  
 Typical ranges are  $10^4 - 10^7$  V/A

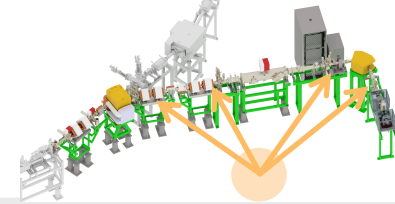


Modell	DHPCA-100											
Anwendungsbereich	Low Noise						High Speed					
Transimpedanz [V/A]	$10^2$	$10^3$	$10^4$	$10^5$	$10^6$	$10^7$	$10^3$	$10^4$	$10^5$	$10^6$	$10^7$	$10^8$
3-dB Bandbreite [MHz]	200	80	14	3,5	1,8	0,22	175	80	14	3,5	1,8	0,22
Anstiegszeit (10%-90%)	1,8 ns	4,4 ns	25 ns	0,1 $\mu$ s	0,2 $\mu$ s	1,6 $\mu$ s	2,0 ns	4,4 ns	25 ns	0,1 $\mu$ s	0,2 $\mu$ s	1,6 $\mu$ s
Equ. Eingangsrauschen [fA/ $\sqrt$ Hz]	200 pA	16 pA	2,1 pA	500 fA	170 fA	60 fA	140 pA	6,0 pA	1,5 pA	450 fA	150 fA	55 fA
Genauigkeit	Verstärkung $\pm 1$ %											
Tiefpassfilter	Umschaltbar auf 1 MHz, 10 MHz oder volle Bandbreite											
Ausgang	$\pm 1$ V @ 50 $\Omega$ Last											
Bias Spannung	$\pm 10$ V, max. 22 mA, verbunden mit BNC-Außenleiter, schaltbar auf Masse											
Versorgungsspannung	$\pm 15$ V, + 110 mA / - 90 mA typ., $\pm 200$ mA empfohlen											
Steuer Interface	Opto-Koppler geschützte digitale Eingänge, TTL/CMOS kompatibel, sowie ein analoger Eingang zur Steuerung der Offset Spannung											
Gehäuse	170 x 60 x 45 mm (L x B x H), Gewicht 320 g											
Datenblatt	568 kB											

Offset über Trimmer und externe Steuerspannung einstellbar. LED Overload Anzeige. Eingang gegen Transienten bis  $\pm 3$  kV geschützt. Ausgang kurzschlussfest. Versorgungsspannung  $\pm 15$  V über 3-Pin LEMO Buchse. Ein passender Stecker wird mitgeliefert. Passendes Netzteil der Serie PS-15 optional erhältlich. Weitere Einzelheiten siehe Datenblatt.

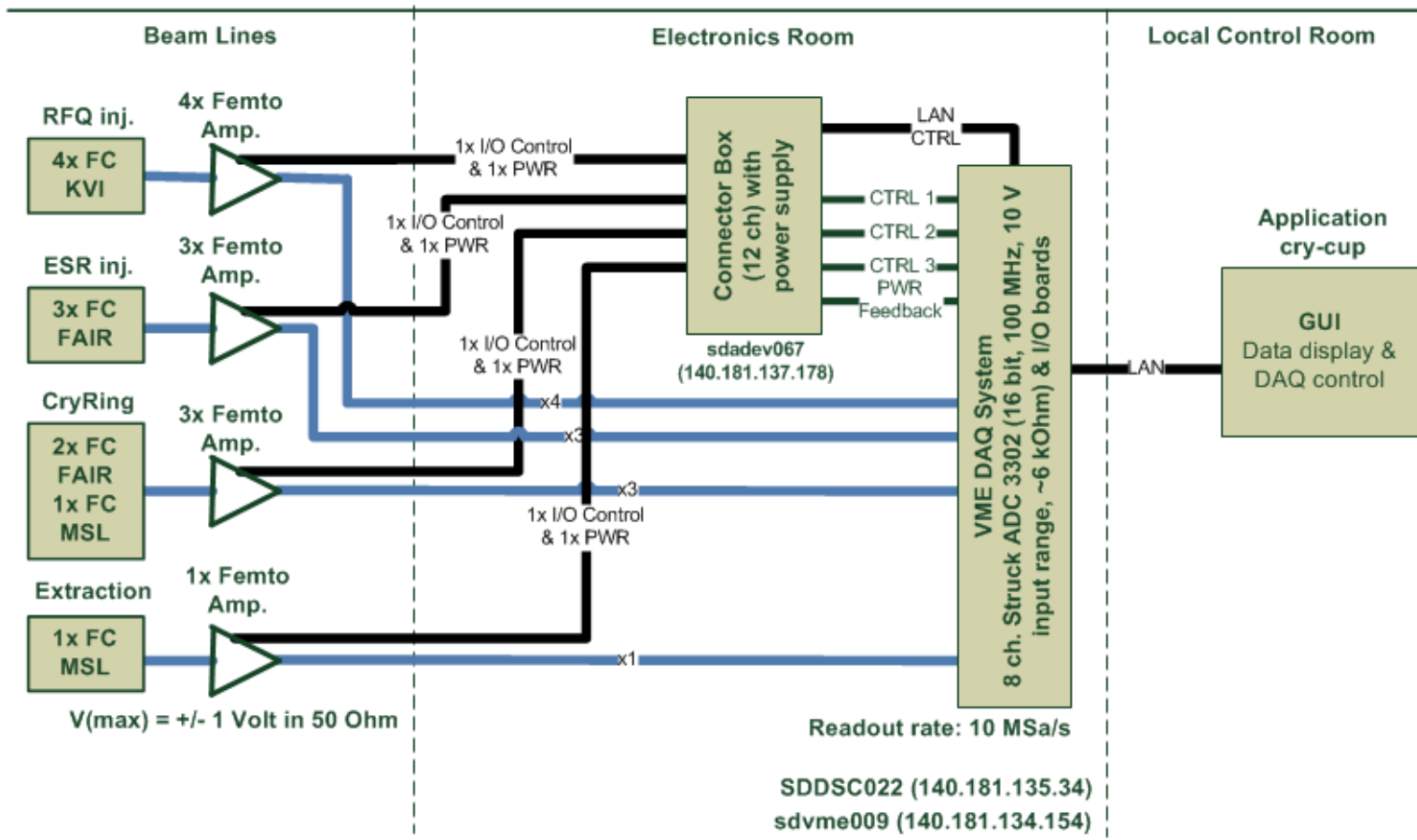


# Current Measurement Hardware Scheme

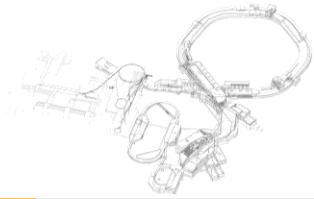


## CRYRING Ring Instrumentation Schematic of Faraday Cup & DAQ System Version 4

A. Reiter  
3rd April 2017





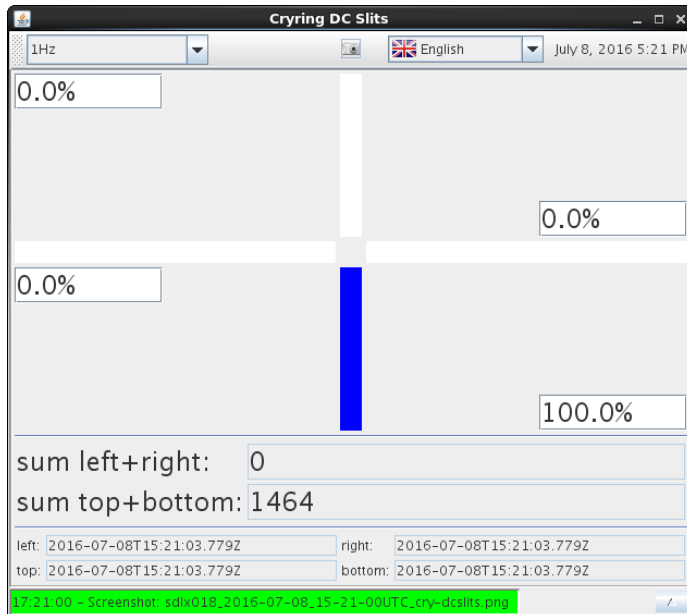


# RFQ Iris for injection optimisation

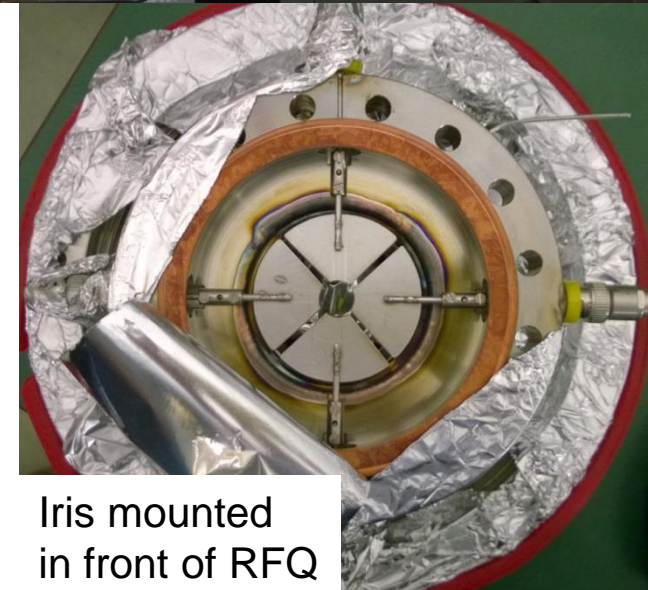
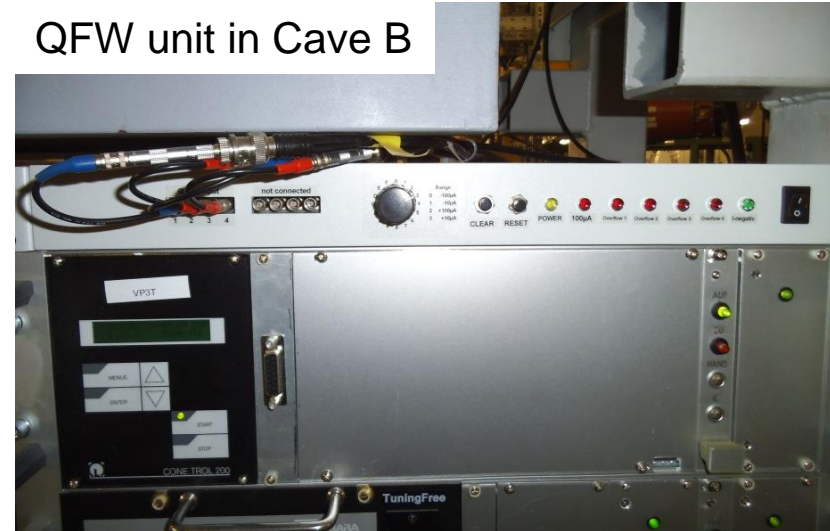
## Current readout at RFQ entrance



- Originally used for DC ion source!
- Now only useful, if chopper window long enough. Check background counts carefully!!!
- 4 channel QFW prototype (charge-to-frequency converter), sensitivity  $S = 250$  fC/count
- 10  $\mu$ A range with max. output = 40 MHz
- Pulse signals are registered in dedicated scaler of VME DAQ for intensity measurements (PCT, ICT, CryRadio)
- Separate application: [cry-dcslits](#)

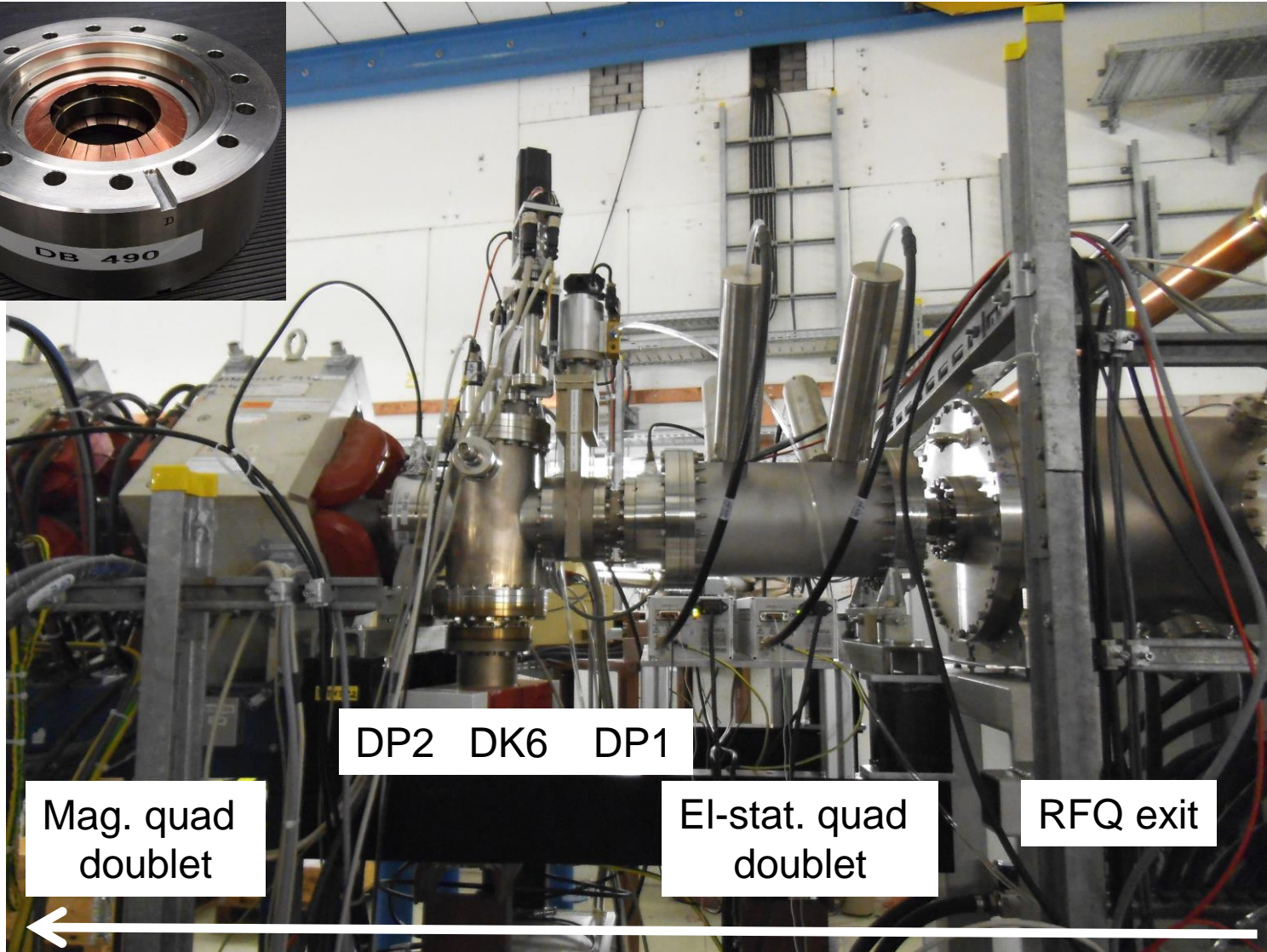
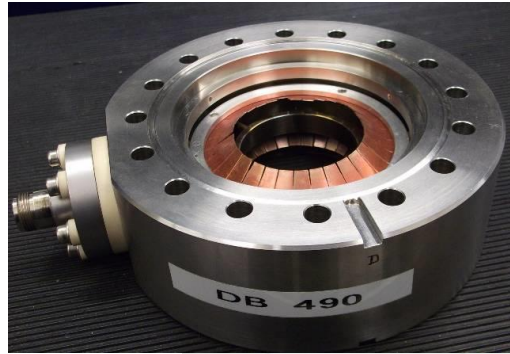
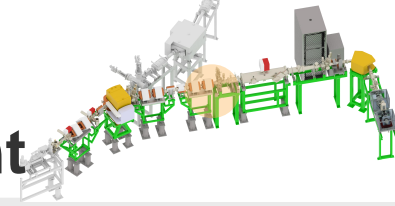
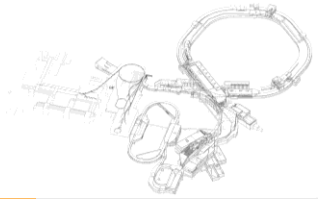


QFW unit in Cave B



Iris mounted in front of RFQ

# Diagnostic section after RFQ Ring pickups for energy measurement



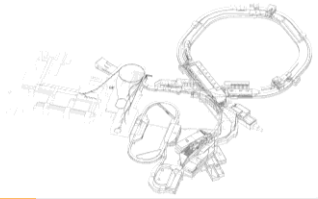
DP3

DP2 DK6 DP1

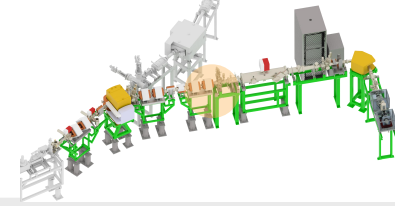
Mag. quad  
doublet

El-stat. quad  
doublet

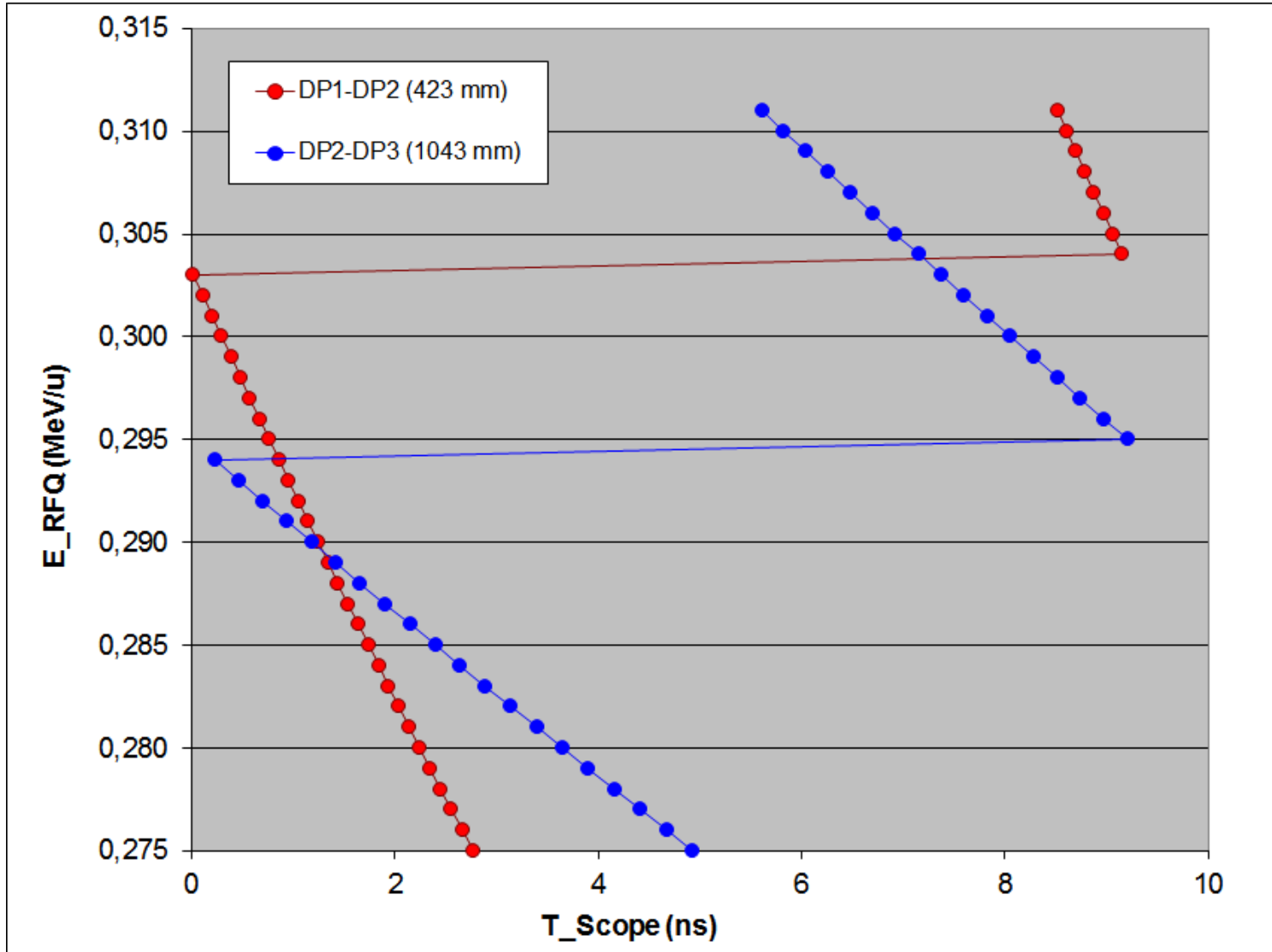
RFQ exit

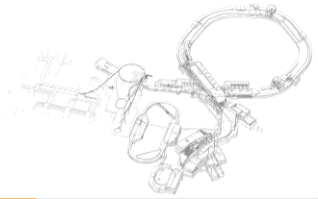


# Beam energy as function of time-of-flight $T_{\text{Scope}}$

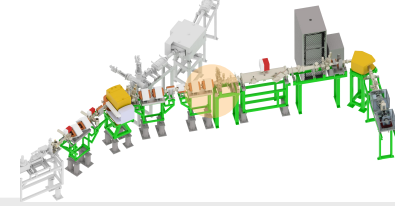


Fractional part of theoretical total flight time converted to energy





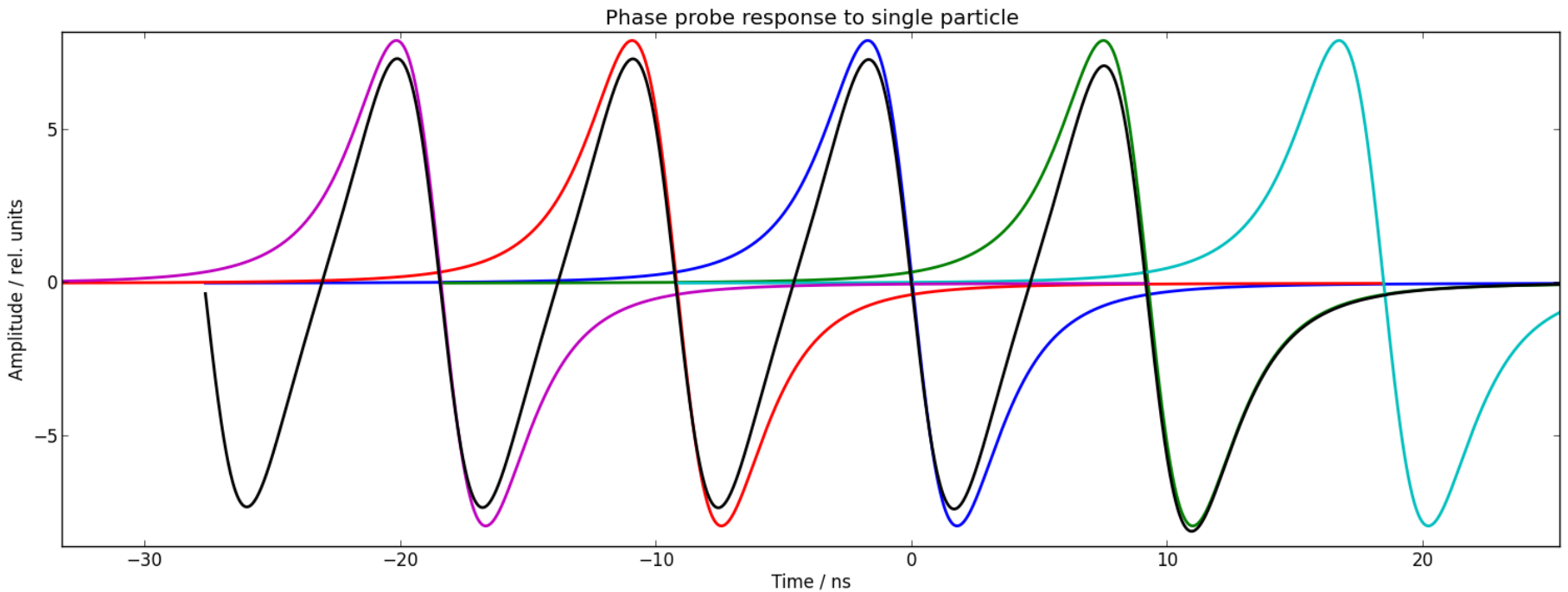
# Pickup response & signal overlap

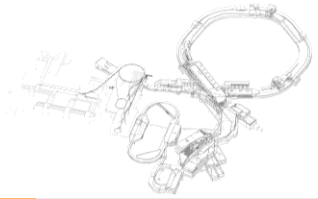


Theoretical response for a single particle at rf frequency = 108.48 MHz

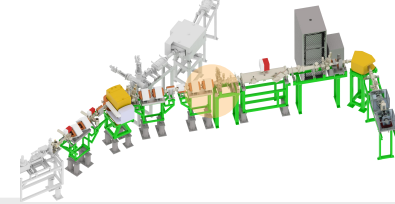
RC circuit response will affect signals slightly.

Longer bunches after drift affect the signal amplitude strongly due to overlap of single responses.

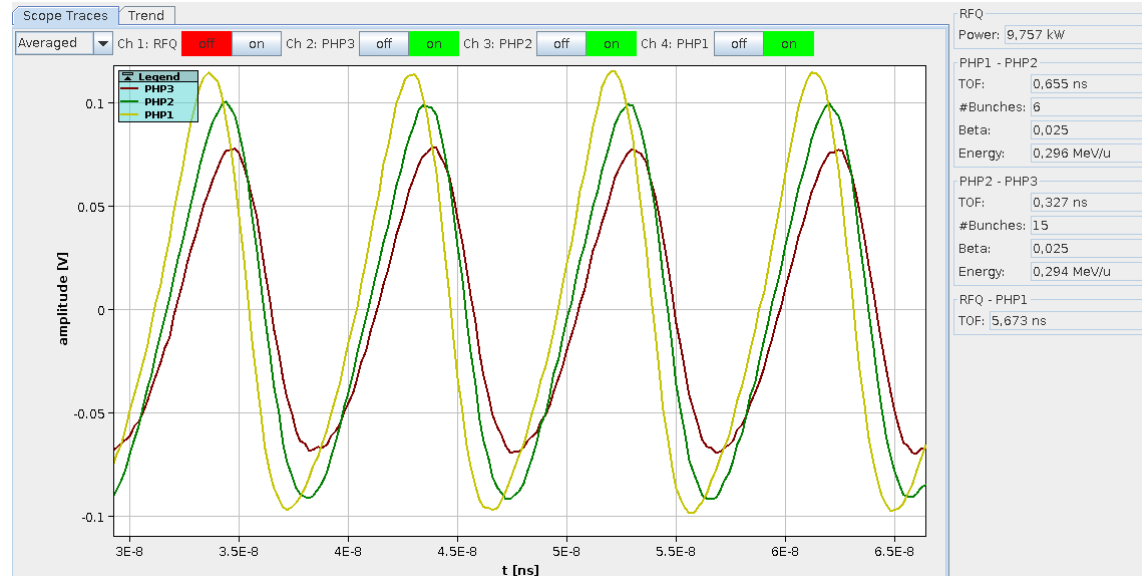




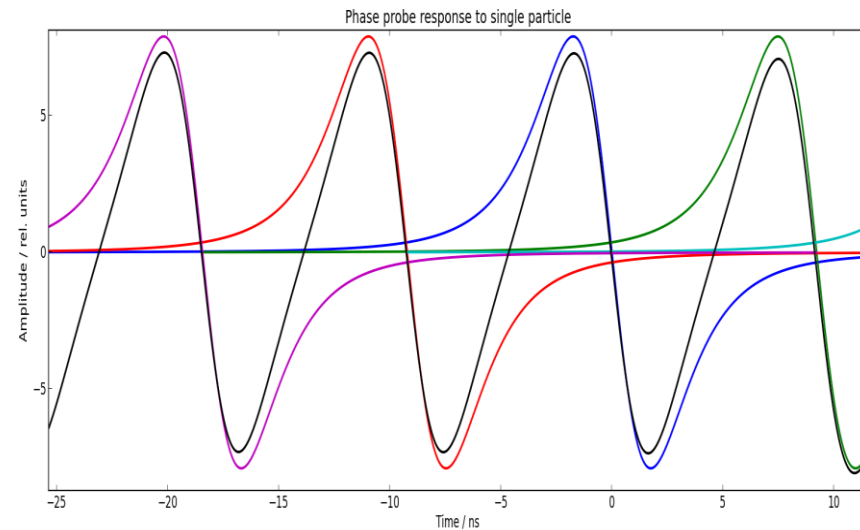
# Comparison of theoretical and real signal shapes

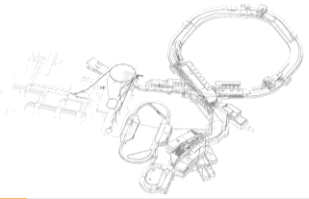


Measured data  
DP1, DP2, DP3

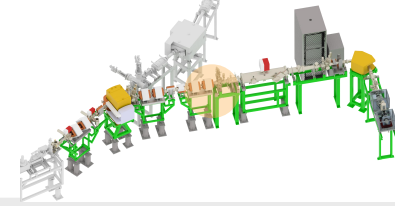


Scaled simulated  
signal shapes (colour)  
and  
signal sum (black)



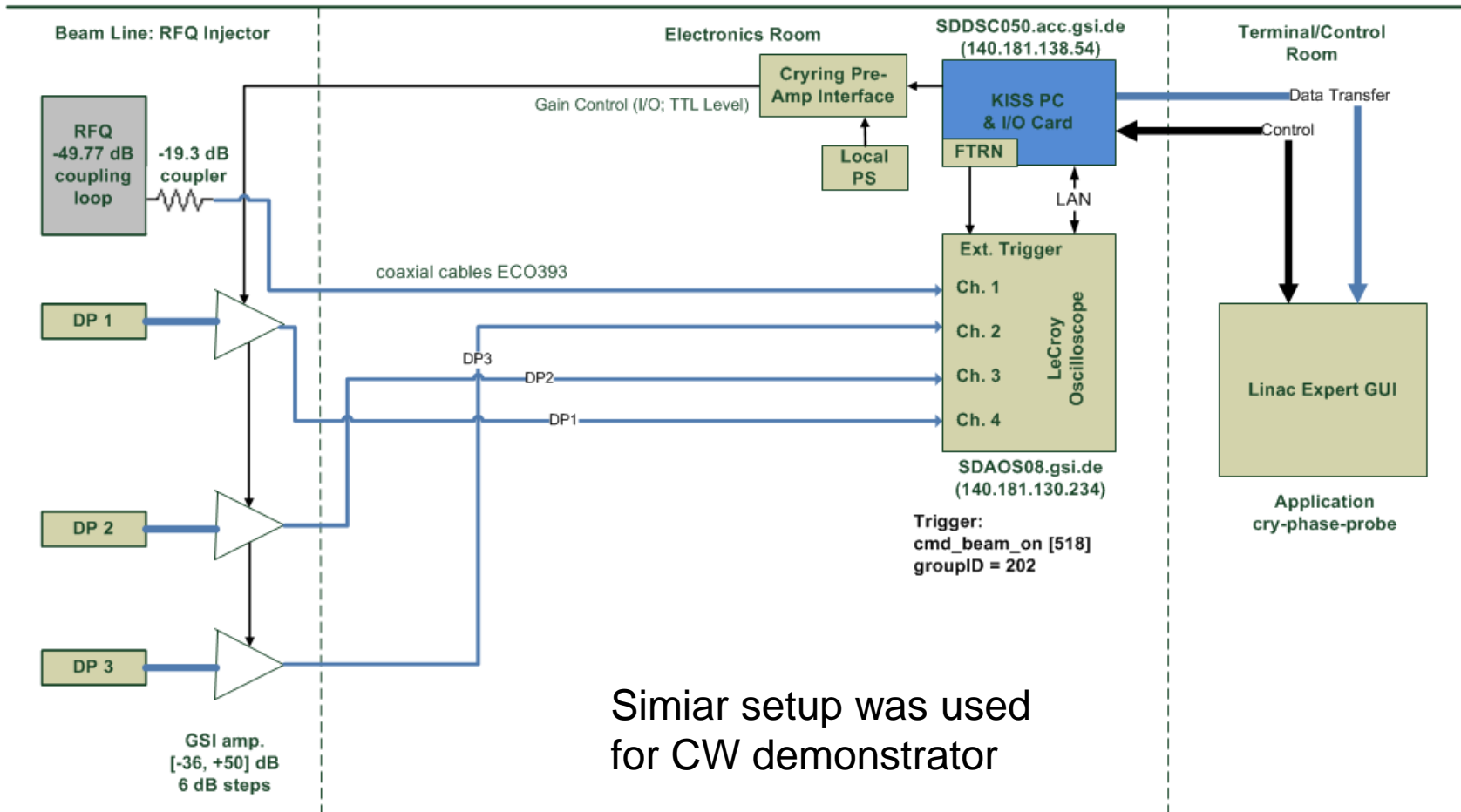


# Energy Measurement Hardware Scheme



## CRYRING Injector Linac Schematic of Pickup Electronics & DAQ

A. Reiter  
27th March 2018



Similar setup was used for CW demonstrator

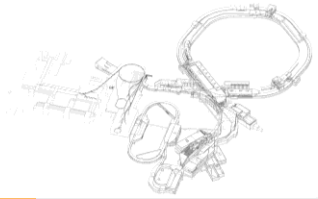
# Energy Measurement Expert GUI application cry-phase-probe

Timebase: 20  $\mu$ s  
for standard use

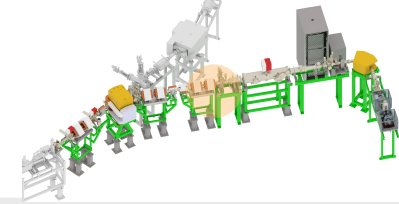
Set trigger offset  
such that all data  
are taken in  
macropulse.

Set full voltage  
range on scope  
gain: +38 dB  
(typically fixed!)

Design energy  
input defines  
bunch number for  
energy calculation



# Energy Measurement Data treatment & display



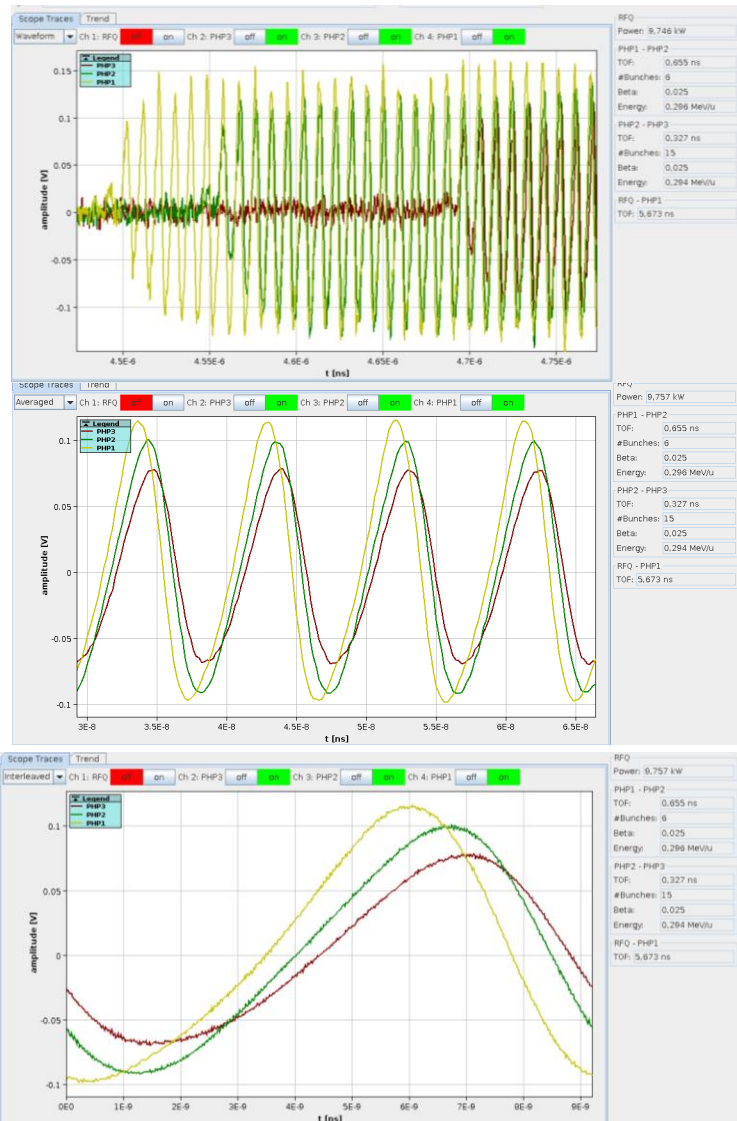
**Waveform:** Raw data acquired by oscilloscope

Make sure to check for signal overload or ADC saturation in this mode!

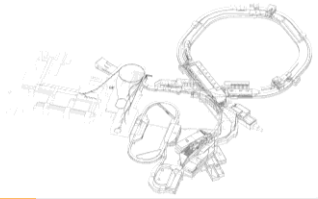
**Averaged:** Average over 11 blocks of 507 samples (~11.2  $\mu$ s of data)

**Interleaved:** Averaged waveforms folded into one RF period

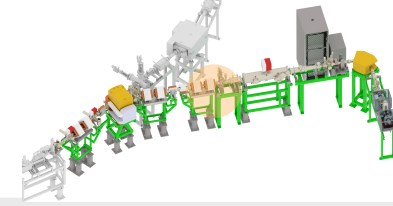
The **cross correlation** between interleaved waveforms defines the **time-of-flight** for the energy calculation.







# Energy Measurement Linac & Ring (Schottky)

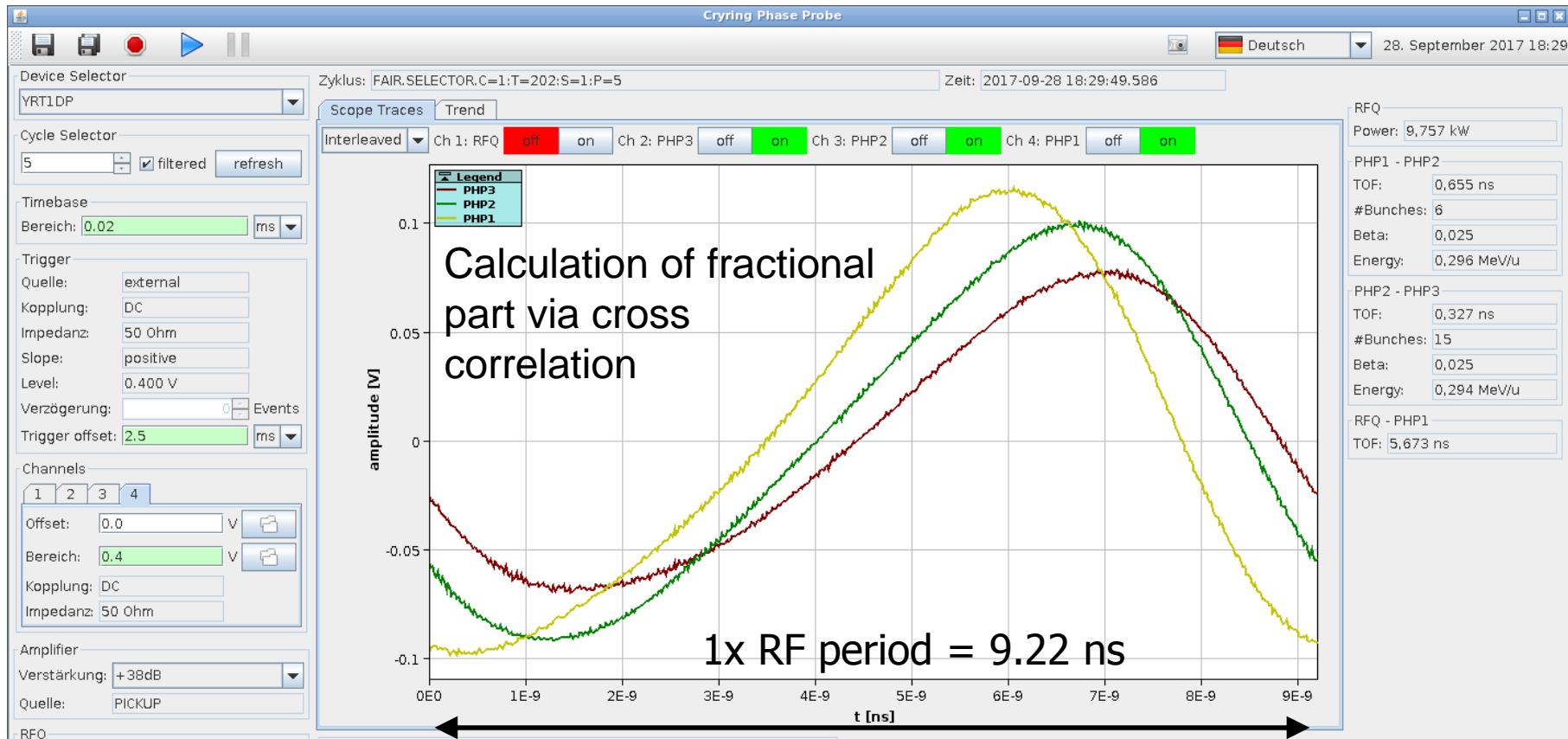


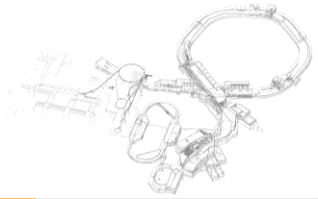
Linac energy from time-of-flight:

- $E(\text{Linac}) = 296.2 \text{ keV/u}$  (drift=0.42 m) for PHP1–PHP2  $\rightarrow f(\text{Ring}) = 139.53 \text{ kHz}$  ( $L=54.17 \text{ m}$ )
- Schottky frequency  $f(\text{Ring}) = 140.00 \text{ kHz}$  (sum signal)

Note:

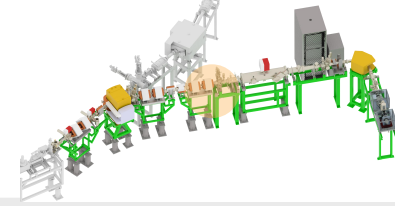
- $E(\text{Linac}) = 293.6 \text{ keV/u}$  for PHP2–PHP3 (ratio~0.991)  $\rightarrow$  absolute value not better than 1 %





# Energy Measurement

## Trend data: stability & resolution



- 5 GSa/s signal digitisation -> 200 ps resolution in raw data
- Analysis of 11 RF periods (oversampling):  $\Delta t \sim 20$  ps in theory
- $\Delta E(\Delta t) \sim 0.2$  keV/u at 300 keV/u (see plot below)
- Relative resolution  $\Delta E/E \sim 7 \times 10^{-4}$  (minimum detectable change)

pickup  
amplitudes  
=  
rel. current

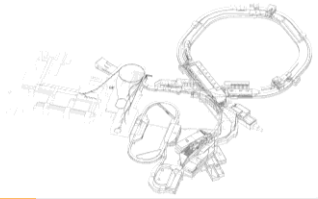
tank signal  
=  
absolute  
RF power

beam  
energy



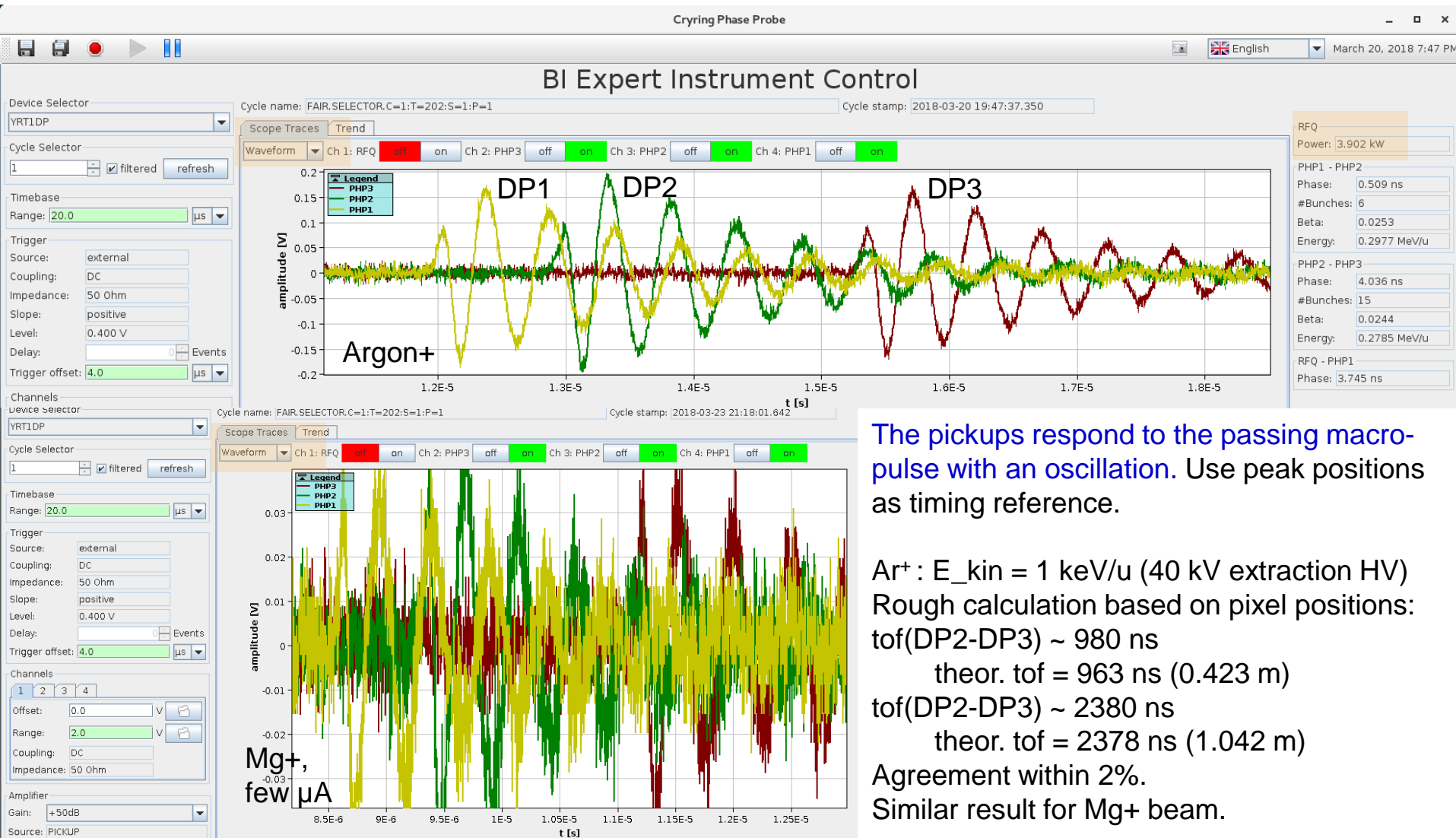
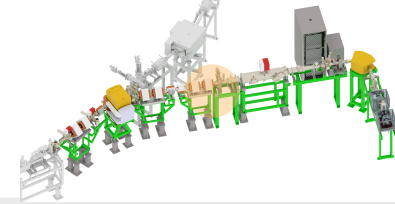
RFQ	Power: 9,748 kW
PHP1 - PHP2	TOF: 0,655 ns
	#Bunches: 6
	Beta: 0,025
	Energy: 0,296 MeV/u
PHP2 - PHP3	TOF: 0,327 ns
	#Bunches: 15
	Beta: 0,025
	Energy: 0,294 MeV/u
RFQ - PHP1	TOF: 5,673 ns

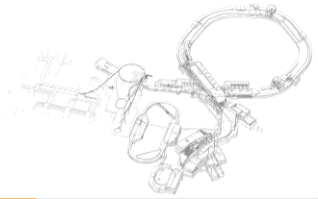
0.4 keV/u



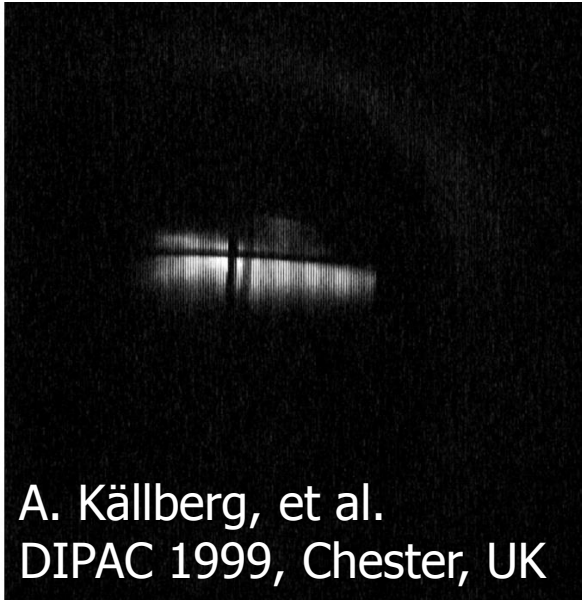
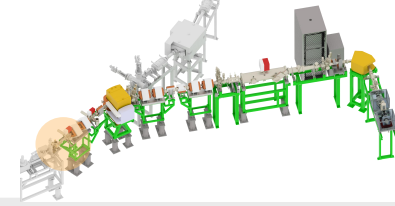
# RFQ transport mode

## No bunches, use Waveforms!

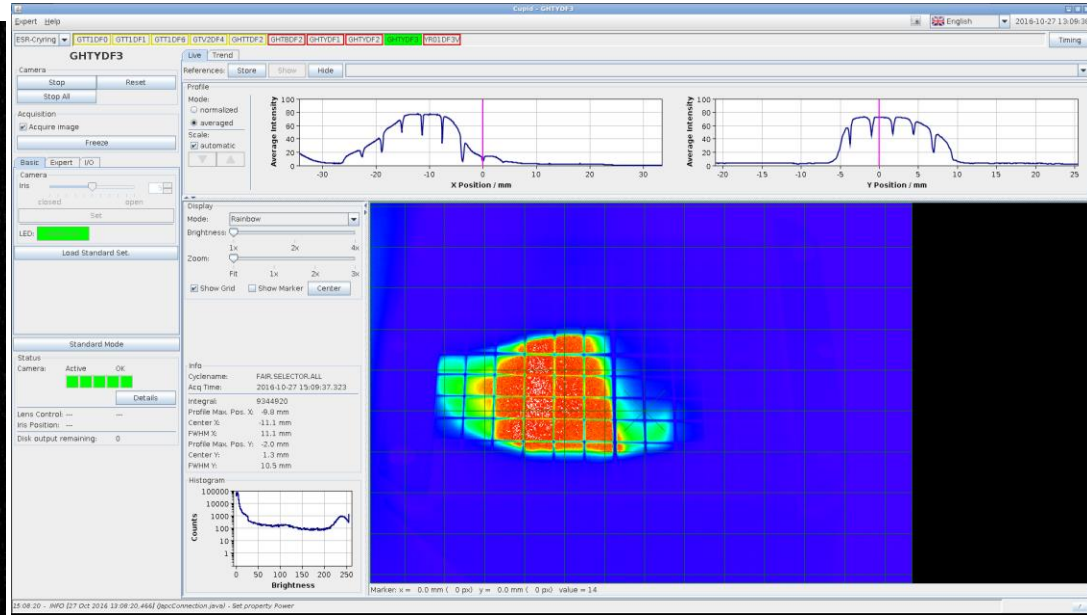




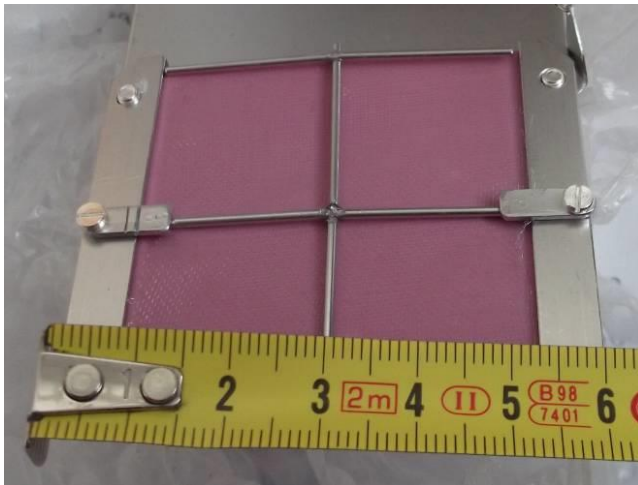
# Injection straight before CRYRING GHTYDF3



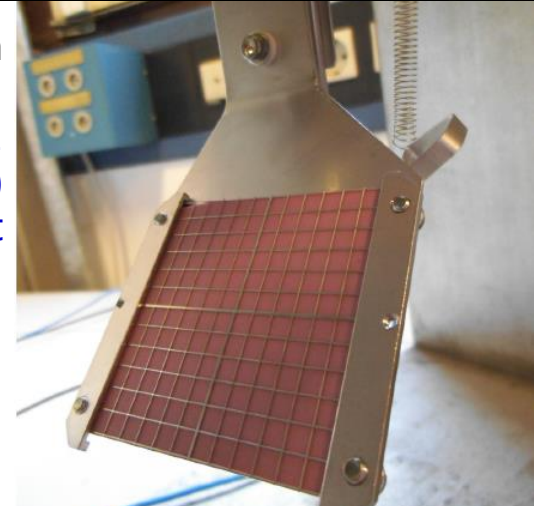
A. Källberg, et al.  
DIPAC 1999, Chester, UK

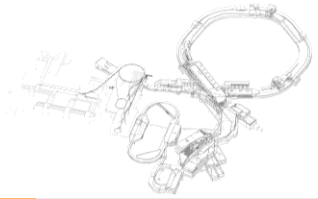


Old MSL  
screen  
with fine  
mesh



Same screen  
with modified mesh.  
Thinner grid version 0.1  
mm instead of 0.2 mm)  
now available, but not  
mounted yet!

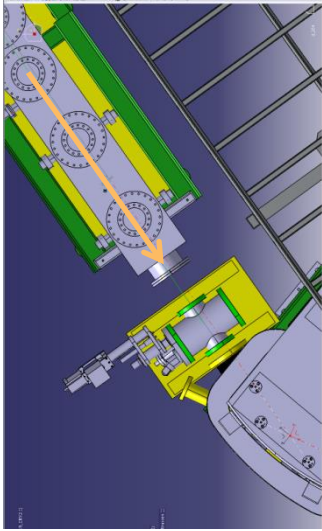




# 1<sup>st</sup> screen in CRYRING YR01DF3



Injection screen at end of 1st section



- Variable positions via horizontal stepper motor drive (different injection orbits RFQ/ESR!)
- Material: Cromox
- New Java FX GUI

CRYRING YR01DF3V Cyclename: FAIR.SELECTOR.ALL Acq Time: 2018-03-13 11:20:25.300

Stop Reset

Timing

Basic Expert

Acquisition mode: triggered

Binning: 1

Analog gain boost (2x):

Exposure time [s]: 0.040

Frame rate [fps]: 3.0

Set

Grid on cromox screen removed

Camera: Active Status Details

Plc: Power Status Details

Profile Trend

300.0 - + A

Intensity

X Position / mm

Intensity

Y Position / mm

Display

Mode: Rainbow

Brightness: 1x 2x 4x

Zoom: Fit 1x 2x 3x

Show Grid  Show Marker Center

Integral	14800263
Profile Max. X	0.9 mm
Center X	0.5 mm
FWHM X	7.0 mm
Profile Max. Y	1.0 mm
Center Y	2.1 mm
FWHM Y	7.8 mm

Histogram

x = 0.0 mm ( 0 px) y = 0.0 mm ( 0 px) value = 253

INFO [13 Mar 2018 11:09:48,388] (JapcConnection.java) - Set property Setting