

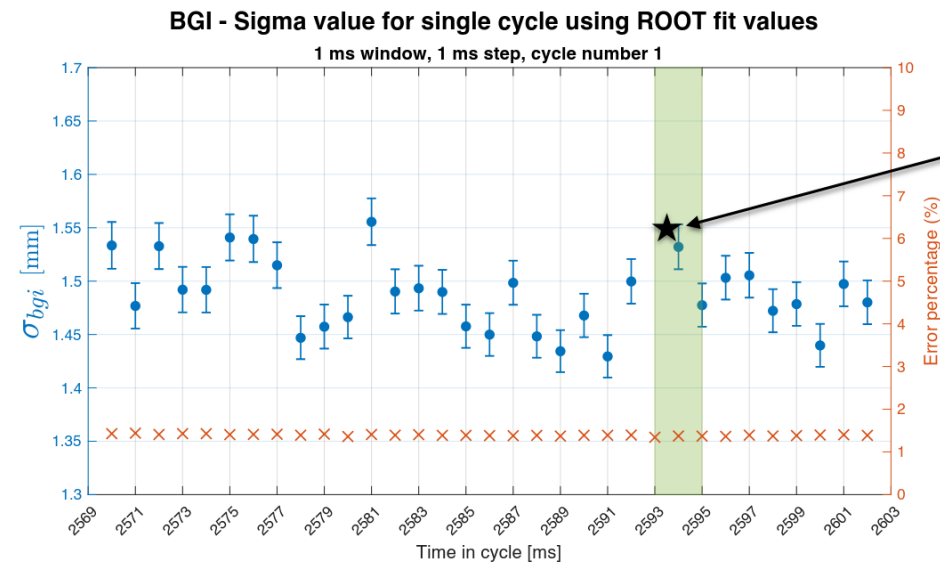
LIU/BI Beam Size Review Summary

A. Guerrero on behalf of BI

BGI

- New monitor based on hybrid pixel detector installed & tested in PS during 2017
- 1-2% error on beam width for single bunch consistent with statistical analysis for Gaussian fit on profile constructed from single electron counting
- Multiple acquisitions show error dominated by injection to injection variations
- 1% error achieved with ~1ms integration: can improve by increasing cathode voltage but already within specification
- Functional specification (EDMS 1233010)
 - Update frequency 0.1-1 kHz ✓
 - Continuous acquisition for 5000 turns (11.5 ms) ✓
 - Precision on beam sigma < 2 % ✓

- YETS17/18:
 - Fix chip #3 & install colder cooling water
- 2018 run:
 - new high speed readout & full FESA integration foreseen
- Decision required on vertical monitor: built with injection of 250kCHF



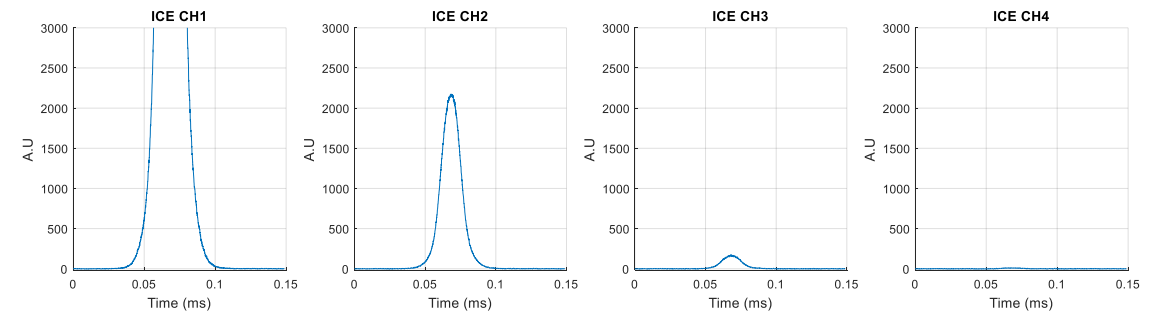
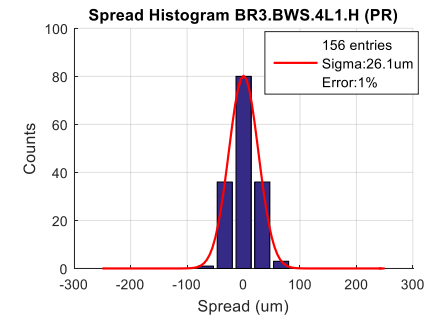
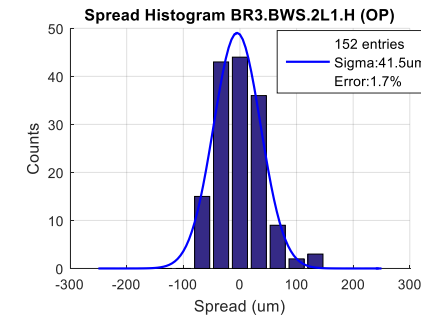
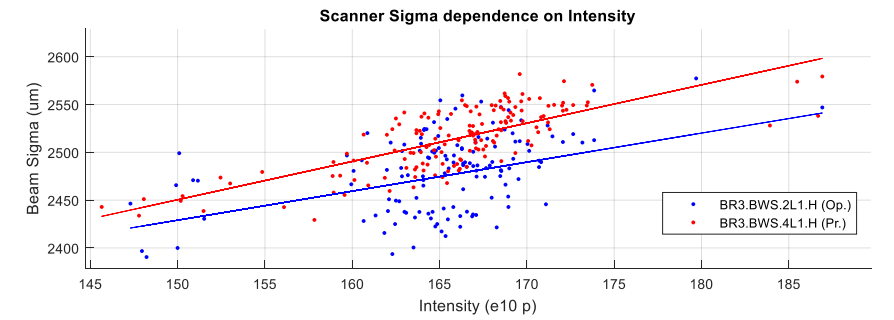
Good agreement with beam size taken from WS logs analysis.

Wire scanners: Mechanics

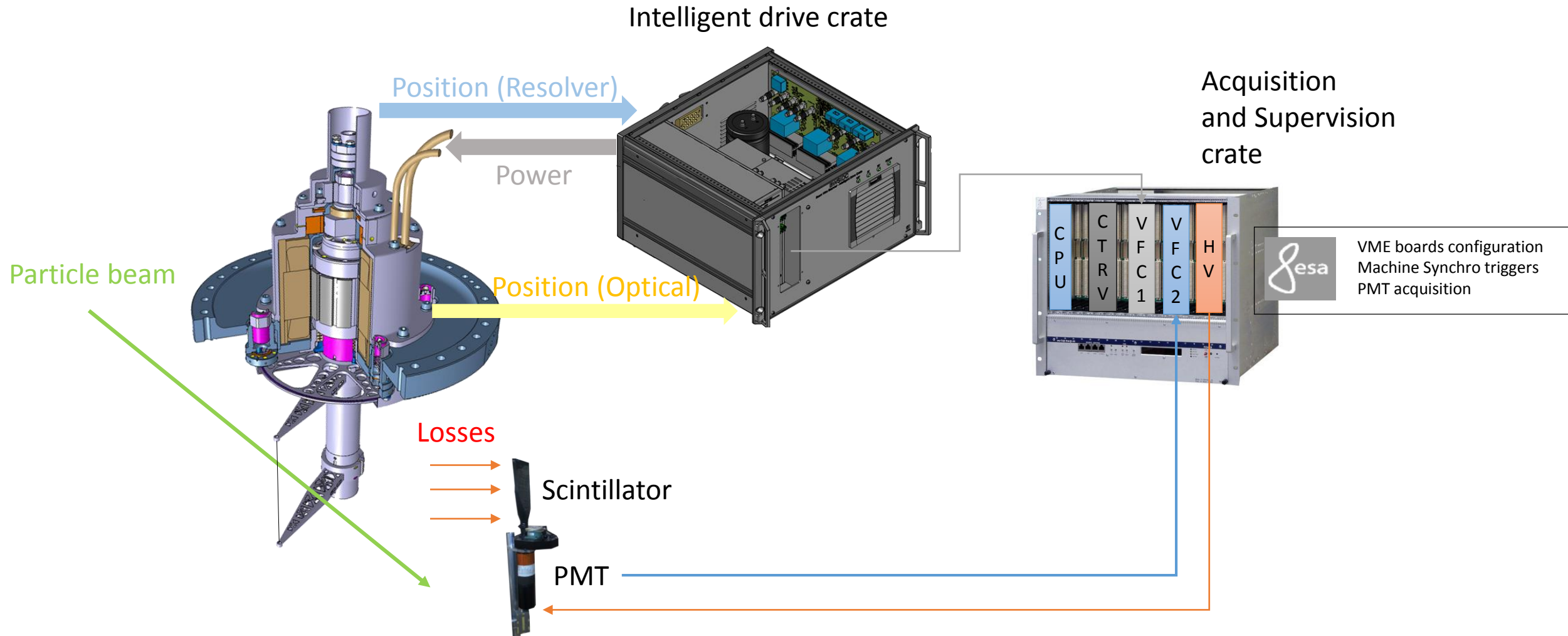
- Good advancement with mechanical production: Orders for 90% of components placed
- Integration nearing completion in all machines
- ECRs being completed as drawings become available
- PS Prototype - everything on track (installation done)
- Series Assembly
 - Foreseen to start in April 2018
 - Delivery of all scanners foreseen by end 2018
- Solution required for slipping glass disk
 - Metallic disk as baseline (awaiting delivery of first full disks)
- Fallback solutions being investigated
 - Design change to PSB scanner with SPS holder design which does not slip
 - Brazed glass disk
- Wire studies
 - Wires from carbon nanotubes under study & to be tested in SPS in 2018
 - Could provide same diameter with similar strength but much lower density

Wire scanners: Acquisition

- Following PSB Beam Test Results: Improvements made to acquisition system
 - Managed to reduce error of new scanner compared to operational scanners
 - Taking shot-to-shot variations into account reached 0.8% uncertainty compared to 1.4% uncertainty with current operational system
- Use of 4 parallel acquisition channels with different gains based on multi-PMT system
 - Successfully showed that dynamic range of $1e3$ can be covered with no tuning required
- YETS17/18: Install M-PMT in PS
- Milestones for the acquisition system:
 - End 2017 Final acquisition baseline
 - Sep 2018 Detector side validation (multiPMT concept) in all machines



LIU Wire scanner system architecture

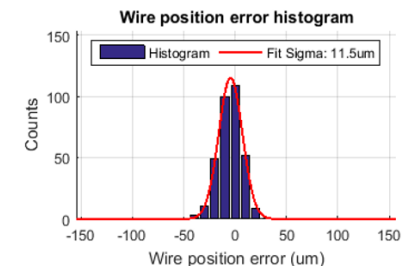
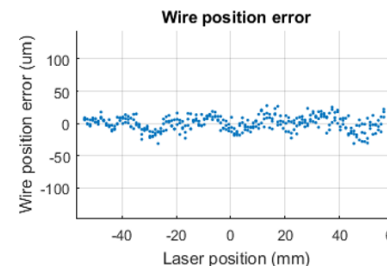
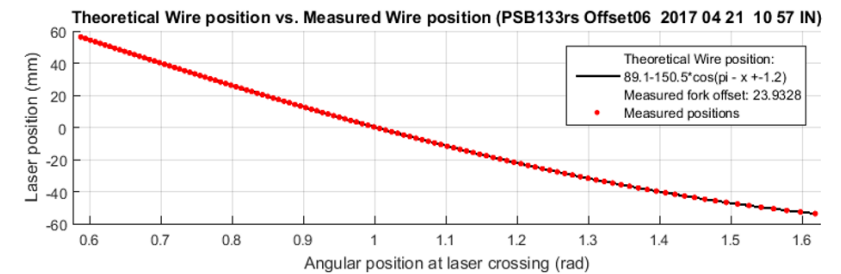
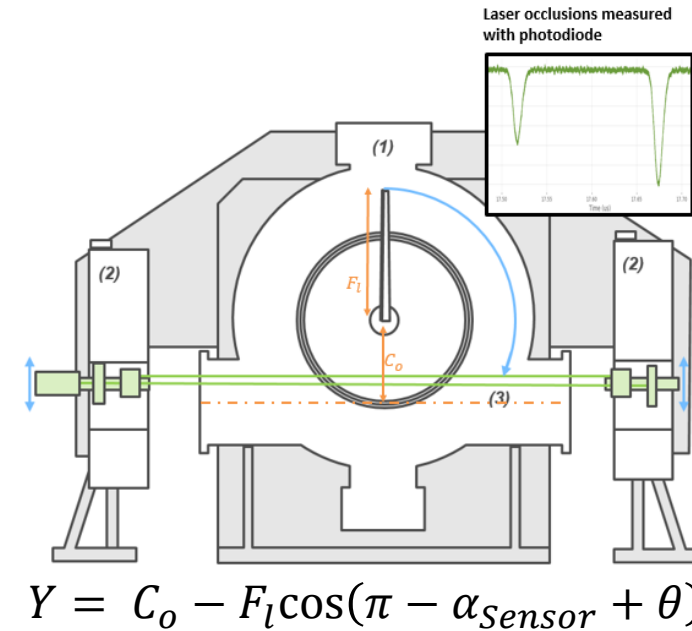


Wire scanners: Electronics

- In-house power driver
 - New DC-bus charger concept to reduce the time between consecutive measures
 - Developing & testing the link between Motion Control Unit – Power Driver
- VFC-based surface digitalization with several fast ADCs in parallel
- Milestone for the electronics control:
 - Apr 2018 Pre-series production and assembly
 - Jun 2018 Validation using calibration bench (Bld. 867) of the final system. Motion performance optimization.
 - Sep 2018 Validation with the PS scanner prototype in the machine.
 - End 2018 Validation of final electronics with beam
 - 2019 Production and tests of series

Wire scanners: Calibration

- New lab test bench constructed & used throughout the year
- Stable performance demonstrated
- Residual error similar with & without vacuum
- Residual single scan position error depends on scan speed
 - 12um and 6um for 20ms-1 & 8ms-1 respectively
 - Different motion profiles being considered to try and reduce error at 20ms-1
- Calibration to calibration offset reproducibility at 20-30um level
 - Should not influence beam size calculation
 - Source nevertheless under investigation



BWS 54H

- Calibrated scanner installed on the 18.01.18
- Test of the device with development electronics
- Power and position control electronics are currently being finalized
- Acq and supervision electronics expected for July
- Installation of final electronics foreseen in the last TS of the run
- SW to be started by a new staff coming in June



TxT electronics for injection SEM-grids

- Common design PSB and PS
 - Amplification adapted to the machine
- System includes
 - ADC to be installed in a VME crate with RS-422 interface for amplification control
 - Power supply and control electronics for amplification
 - Amplifier crates in the tunnel
- Foreseen to install the prototype in the last TS of the run on 1 grid
 - Control electronics to be received by March
 - Amplifiers expected in June
 - ADC prototype OK for assembly
 - Skeleton of FESA class available for test

Conclusion

- BGI
 - BGI H monitor has provided promising results
 - Green light to start the construction of the BGI V monitor
 - Operational instrument to be developed in 2018
- Wire scanners
 - Tests in other machines show expected performance
 - Issues of operational WS have been addressed
 - Follow planning: test of 54H in stages, full system after last TS of 2018
- TxT SEM-grid acquisition
 - Prototype to be installed during last TS of 2018 for dedicated MD by the end of the run