

MicroTCA.4-based BPM and orbit feedback systems at Sirius

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Sirius main parameters





Storage Ring	— Si
Beam energy	3.0 GeV
Circumference	518.4 m
Number of bunches	864
Bunch length	10 ps
RF frequency	500 MHz
Lattice	20 x 5BA
Current, top up	350 mA
Natural emittance	0.27 nm.rad
# of BPMs	~180 + ID BPMs
# of fast correctors	~ 160 (H + V)

Comissioning scheduled for 2018

Current test crate





Digitizer + DSP boards





Developed in partnership with Warsaw University of Technology (WUT)

Both open hardware:

http://www.ohwr.org/projects/afc http://www.ohwr.org/projects/fmc-adc-130m-16b-4cha

Firmware and software



DSP core: GPLv3 firmware available at https://github.com/lerwys/dsp-cores/

Current RF front-end



Switching RF front-ends: Correlates noise from DC to few kHz Controlled via Ethernet Housed in custom enclosure No mixers









Next project: RTM RF front-end





- Zone 3 connector performance @ 500 MHz
- Noise from power supply and from high-speed electronics



Next project: data distribution



Next project: intracrate communication







- Sirius will adopt MicroTCA.4 for BPM electronics and FOFB.
- Current BPM electronics and digitizers meet specification.
- Adoption of RTM depends on EMI measurements.
- Inter- and intracrate data distribution to be tackled.
- We share: most software and hardware are open source.

Thank You!



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	Setup 1	Setup 2
Crate	Vadatech VT811	Schroff 11850-026
МСН	Vadatech UTC002	NAT-MCH-PHYS
CPU	WUT AMC CPU V2 COMex-i7 Vadatech AMC717 Vadatech AMC720	NAT-MCH-RTM-COMex-i7
Power Supply	Vadatech UTC017	WIENER PM-AC-1000





Simulation parameters:

Vacuum chamber bandwidth = 15 kHz BPM filtering group delay = 3 x FOFB sampling period (from 300 μ s to 30 μ s) PI tuned for maximum disturbances amplification of 5 dB







