Experiment Proposal: AR_2012_No3

Title	Author/Spokesperson
Test of LHC-type Secondary Electron Monitor (BLMS) with fast extraction	**A. Reiter (1431)**

Summary & Aim

- **This test is part of the R&D for FAIR: Feasibility of SEM application in high-radiation environment at pBar Separator**
- **Test of new FESA class for fast current digitization in 50 Ohm system**
- **Test of new QFW hardware with stretcher electronics**
- The response of one SEM (CERN LHC-type) will be investigated for short beam pulses. These pulses will be produces from SIS18 using fast extraction.
- Requested beam time: 1 shift
- Test of FESA DAQ & analogue electronics chain: switchable attenuator + fixed-gain amplifier; tests with long analogue cables ; test of QFW and pulse stretcher with fast signals

Machine parameters

Machine	SIS18, fast extraction, h = 4
Mode	B-exp
Exp. area	HTP
Ion species	Uranium, Nitrogen
Beam energy	300 – 800 MeV/u
Spill length	1 µs extraction; 4 bunches of ~100 ns length
Particle number	10^7 – 10^9 per spill (depending on Z and energy)
Repetition rate	~ 0.1 Hz or higher
Shifts	1 shift
Beam Time Period	Any machine experiment (B-exp) **after September 2012**
Health & Safety	No concerns

Experiment procedure

After setup of beam at end of HTP line, the following series of data are taken:

- SEM currents as function of particle number, ion energy and SEM high-voltage
- Reference detector at HTP: Resonant Transformer or Fast Current Transformer
- Test of new FESA readout electronics & QFW with pulse stretcher

Experiment Setup		
Exp. area	HTP, in front of beam dump	
Description of setup	• LHC-type secondary electron monitor BLMS • Detector position behind exit of last diagnostics chamber • Distance to beam dump: ~50-100 cm • Test together with RT+FCT installed at HTP beam line	
Duration of setup	• Mounted only during beam time on existing pneumatic actuator	
DAQ & Electronics **Software**	Long cable to Atomic Physics (AP) container, switchable attenuator and fixed-gain amplifier, FESA crate with I/O modules and CAEN 32-channel ADC, digital oscilloscope, 4-channel QFW board FESA class to be expanded to include I/O modules, etc….. Java GUI (to be developed)	
Trigger	Acquire full extraction of 4 bunches	
Experiment Preparation / Required support **Estimated amount of time, manpower and equipment**		
Estimates or simulations	1 day	Signal estimate A. Reiter
Mech. Workshop		Not required
Beam Line Installation	2 h	H. Graf: Re-mount SEM on pneumatic actuator, alignment
Electronics & DAQ	**6 month**	Development of FESA class (H. Bräuning) Electronics with attenuators & amplifiers (N.N.) Setup & test of electronics in DAQ container and tests (A. Reiter / H. Bräuning)
Control System Integration		None
On-site tests		A. Reiter
Modification of exp. area	Yes	RT+FCT installed at HTP; 2-fold FCT electronics 2 RG214 cables to AP container from patch panel
Dismantling	2 h	Dismount setup, store detector at HTP (A. Reiter)
Remarks & Comments		

FESA DAQ hardware & analogue electronics located in AP container

FCT should be available; signal should be available in AP container

QFW signals are fed to Lassie system in AP container (see proposal AR_2012_No5)