

Experiment Proposal: AR_2012_No1

Title	Author/Spokesperson
Test of Ionisation Chamber with Fast Extraction	A. Reiter (1431) M. Witthaus (2447)

Summary & Aim

- **R&D for FAIR: Adaptation of QFW electronics to fast extraction**
- **Feasibility of air-IC application in high-radiation environment at pBar Separator**
- The response of an ionisation chamber will be investigated for short beam pulses. These pulses will be produced from SIS18 using fast extraction.
- Requested beam time: 1 shift
- Measured quantities: Signal strength and linearity (comparison/extrapolation to pBar Separator parameters)
- Test of DAQ & analogue electronics chain: QFW & pulse stretcher
- Recorded data: Chamber signals as function of particle number, QFW/pulse stretcher parameters and high voltage setting

Machine parameters

Machine	SIS18, fast extraction, h = 4
Mode	B-exp
Exp. area	HTP
Ion species	Uranium, Nitrogen
Beam energy	300 – 800 MeV/u, in principle any
Spill length	1 μ s extraction; 4 bunches of \sim 100 ns length
Particle number	10^4 – 10^9 per spill
Repetition rate	\sim 0.1 Hz or higher
Shifts	1 shift
Beam Time Period	Any machine experiment (B-exp) after June 2012
Health & Safety	No concerns

Experiment procedure

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

- Ionisation chamber response as function of particle number (one beam energy)
- Reference detector at HTP: Resonant Transformer or Fast Current Transformer
- Test of readout electronics: Charge-to-frequency converter (QFW) and scaler/counter system

Experiment Setup		
Exp. area	HTP, in front of beam dump	
Description of setup	<ul style="list-style-type: none"> • SEM-type ionisation chamber (IC) in air (+ LHC-type BLMI) • Detector position behind exit of last diagnostics chamber • Distance to beam dump: ~50-100 cm • Test IC with positive and negative HV 	
Duration of setup	<ul style="list-style-type: none"> • Mounted only during beam time 	
DAQ & Electronics Software	Long cable to Atomic Physics container, signal stretcher (RC-circuit), QFW or IFC converter & Ablass system, digital oscilloscope Standard operating software	
Trigger	Acquire full spill	
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	3 h	H. Graf: Remount SEM on pneumatic actuator, alignment
Electronics & DAQ	3 days	Setup of electronics in DAQ container and tests (A. Reiter / M. Witthaus)
Control System Integration	1 day	Trigger of Ablass scaler system: Due to pulse stretching acquisition between events [32,55] ??? Window: [flat top, extr.+250 ms]
On-site tests		
Modification of exp. area	No	Pneumatic actuator in place at HTP 2 RG214 cables to AP container from patch panel
Dismantling of setup	2 h	Dismount setup, store detector at HTP (A. Reiter)
Remarks & Comments		