	Beam Diagnostics Group Technical Document	18.06.2010
Test of Cern LHC beam loss monitors at HTP with Uranium beam		Author: A. Reiter
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1. Introduction

For the anti-proton target area of FAIR radiation hard beam loss monitors will be necessary to monitor the particle shower created in the target. First beam tests were carried out in two shifts (1st and 2nd of June) with the two types of beam loss monitors that have been developed for the Large Hadron Collider (LHC) where high beam currents will be stored:

- BLMI: Ionisation chamber
- BLMS: Secondary electron monitor, currently on loan from Cern Beam Instrumentation group

These detectors are, in principle, interesting candidates for other areas of beam diagnostics applications.

The detector BLMS was installed in beam line in front of the beam dump to monitor the primary beam, the detector BLMI was mounted at the same position, but ~20 cm above the beam axis to monitor the particle shower created in the 5 mm thick BLMS iron housing.

The detector responses were compared to the secondary electron monitor HTPDI1S, HTPDI1I and the synchrotron transformer S09DTML_GATE.

Beam conditions:

- Particle: Uranium
- Energy: 350 – 800 MeV/u
- Intensity: ~1.0 E7 – 1.2 E9 particles in SIS18
- Slow extraction: 500 – 1500 ms

Data acquisition:

- All detector signals were converted via a current-to-frequency converter (CFC) and recorded in the ABLASS system.
- Spill forms were stored for the detectors:
 - S09DTML_GATE
 - HTPDI1I (Ionisation chamber)
 - HTPDI1P (Plastic scintillator)
 - HTPDI1S (Secondary electron monitor)
 - HTPDI5S (BLMS, CERN SEM)
 - HTPDI5I (BLMI, CERN Ionisation chamber)

2. Results

Example of measurement with 650 MeV/u beam and 1000 ms extraction

S09DTML_GATE

HTPDI1I

HTPDI1P

HTPDI1S

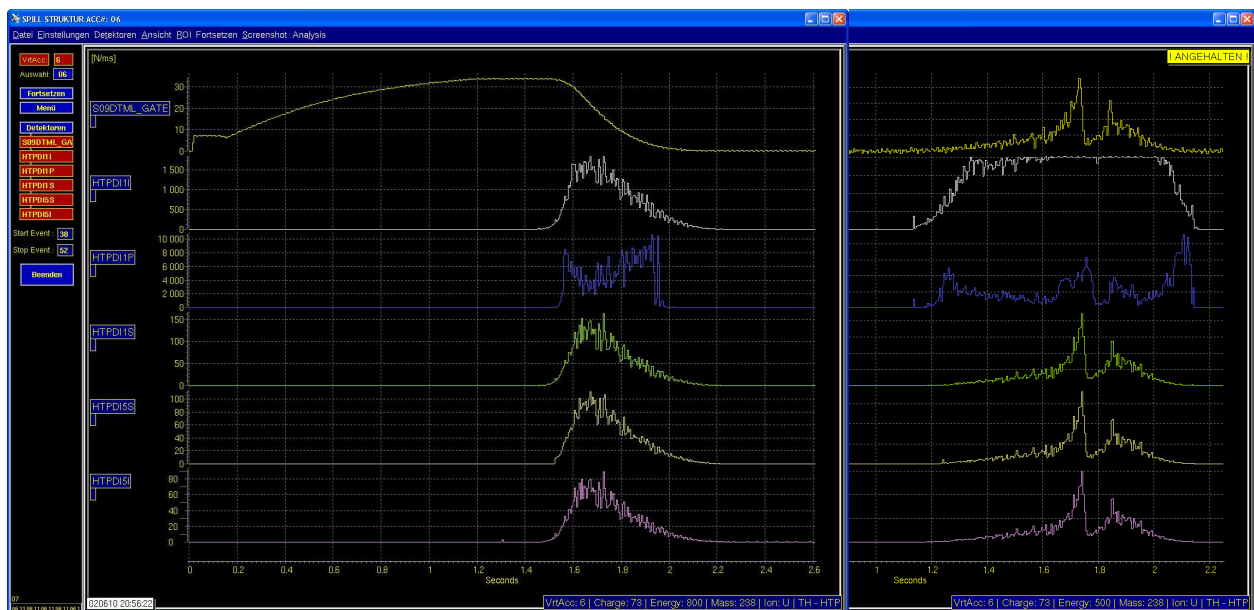
HTPDI5S (BLMS)

HTPDI5I (BLMI)



The data shows a smooth extraction for all detectors for 650 MeV/u ions. The scintillator HTPDI1P, although not inserted into the beam line, saturates and must be excluded from the analysis.

Two examples of measurements with 800 and 500 MeV/u beam and 1000 ms extraction



The two data sets show a smooth spill (left; 800 MeV/u) and a double peak structure (right; 500 MeV/u).

First tests with CERN beam loss monitors at HTP with uranium beam were successful. Both detectors were included in the existing GSI electronics system. As expected, the detector response of BMLS is similar to that of HTPDI1S. The measured spill structures were similar for all detectors (apart for the saturated scintillator).

The tests will be continued with nitrogen beam to investigate the detector responses at much lower specific energy losses.