Test of direct dump BLMs

Monitors and LS1 changes

- Run2 direct dump monitors:
  - BLMPI.04L6.B2I10_TCDQA.A4L6.B2
  - BLMPI.04R6.B1E10_TCDQA.A4R6.B1
  - BLMPI.04L6.B2I10_TCSP.A4L6.B2
  - BLMPI.04R6.B1E10_TCSP.A4R6.B1

- Changes during LS1:
  - TCDQA changed DCUM → BLMPI changed accordingly
  - TCSG changed to TCSP → should be identical for BLMPI signal
  - Redone the hardware of the readout (E. Effinger) → should have identical conversion rate (Gy to bits) as during Run1
    - Can try to verify this before the scheduled test:
      - Compare BLMPI signal to the IC+filter at the same location for some beam dumps

2015 Test of direct dump BLM thresholds

The direct dump thresholds have been set during Run 1 to 20'000 bits. 2 10^{10} protons on the TCSP should lead to a signal of >30'000 bits.

Test Steps:

- Prepare SPS for bunch of 2 10^{10}.
- Change machine critical settings to allow for injection of 2 10^{10} into empty LHC.
- Mask adjacent BLMs.
- Close TCSP (both beams) while setting them off-center.
- Start with pilot bunch on TCSP and increase intensity till dump is triggered.
- Record the beam dump.
- This test must be **repeated for each beam and for both TCDQ and TCSP**.
- From the amount of lost beam and the BLM reading, verify the nominal threshold setting.

Continuation of test steps

- Are there variations with respect to the impact conditions?
- Verify the calibration (bits vs impacting protons)
- Measure delay between the time where the loss signal exceeds the threshold and the time of the beam dump (time stamps XPOC and BIC, opening of the loop requested by TSU)). To estimate the time when the BLM is over threshold, the injection kicker time stamp (which gives the start time of the injection kicker pulse) is added to the injection kicker rise time (this yields the time of injection), and added to the flight time between the injection point and point 6.)
- Time estimate: 2h

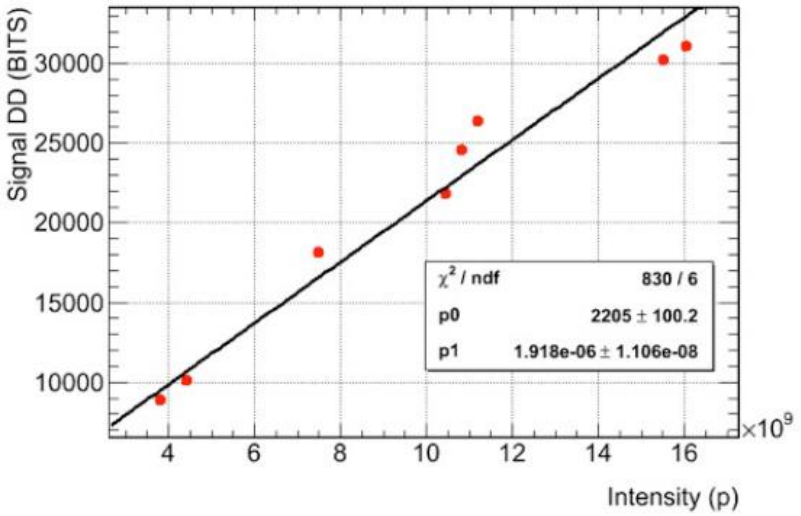
Second test option

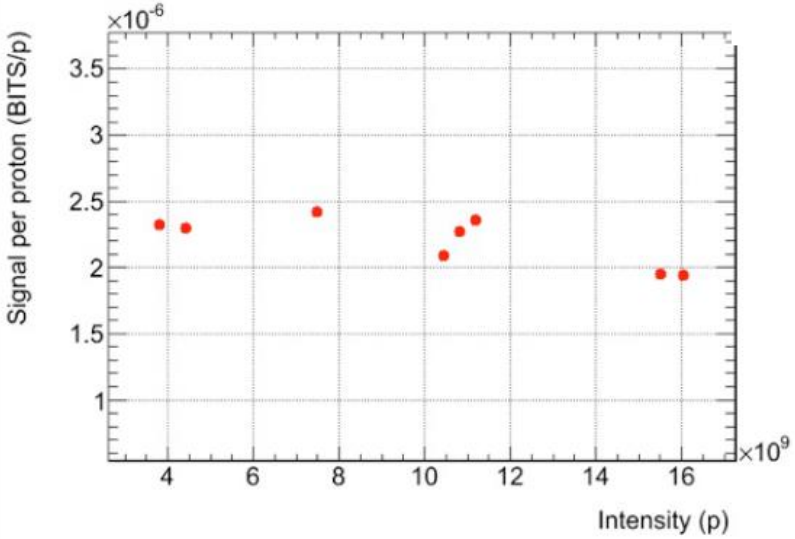
- In case the previous test is not successful, most likely the conversion rate has changed, and we have to re-do the original test sequence:
- Mask adjacent BLMs.
- Reduce the voltage setting of the abort threshold. (access)
- Dump the injected beam on the collimator TCDQ and TCSG (with local bump). The threshold must have been lowered sufficiently, to provoke a beam dump request.
- Record the beam dump.
- This test must be repeated for each beam and for both TCDQ and TCSPG.
- From the amount of lost beam and the BLM reading, deduce the nominal threshold setting.
- Are there variations with respect to the impact conditions?
- Verify the calibration (bits vs impacting protons)
- Measure delay between the time where the loss signal exceeds the threshold and the time of the beam dump (time stamps XPOC and BIC, opening of the loop requested by TSU)in logging DB). To estimate the time when the BLM is over threshold, the injection kicker time stamp (which gives the start time of the injection kicker pulse) is added to the injection kicker rise time (this yields the time of injection), and added to the flight time between the injection point and point 6.)
- Time estimate: 2h (without the two accesses: could be scheduled during injection tests)

Direct Dump calibration exercise

8 shots of probe intensity bunches onto a close TCSG.4L6.B2 were used to calibrate the Direct Dump BLMs.

Approximately linear behaviour On the same support here is one IC and one SEM.



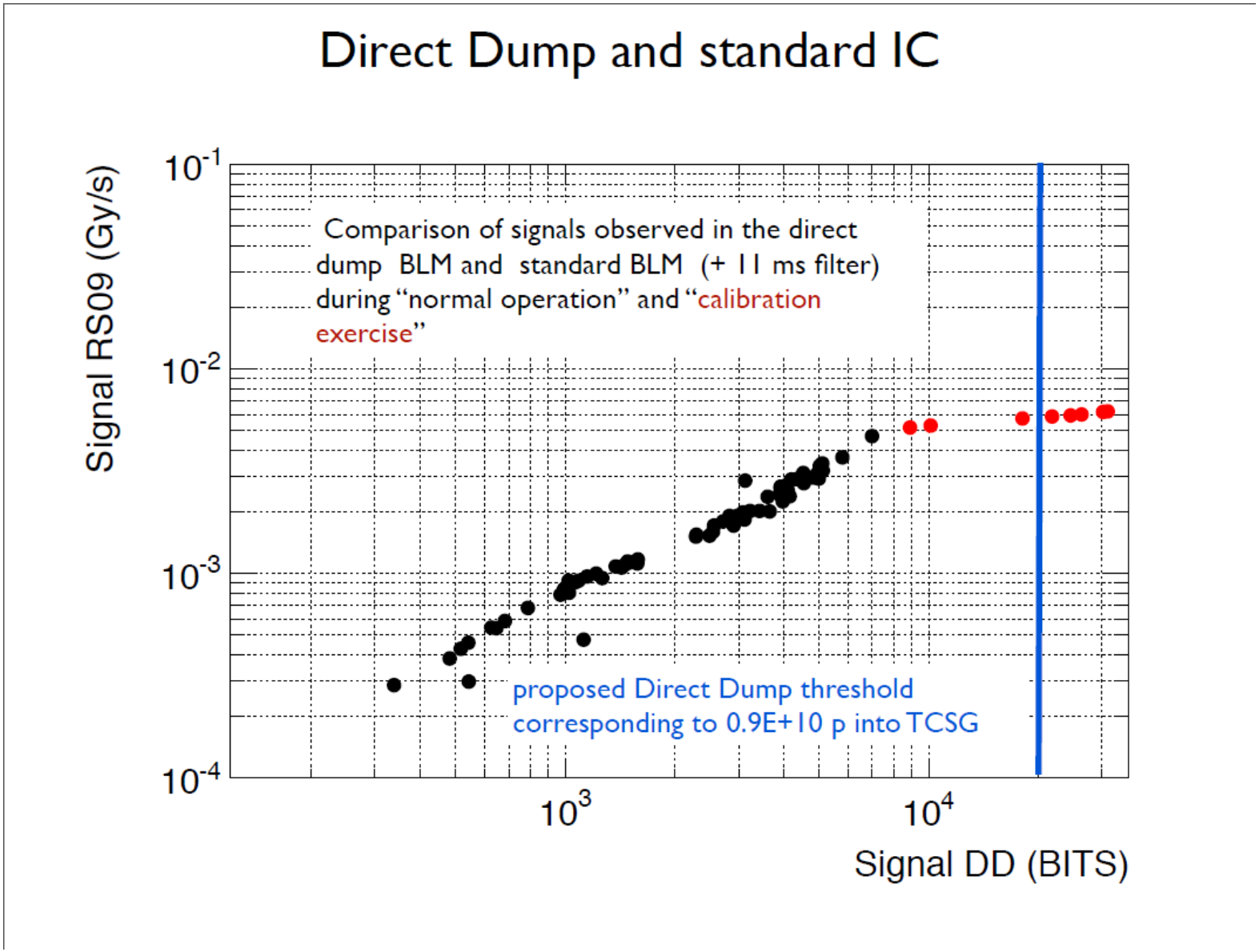


Signal normalized to intensity in order to get a calibration factor.

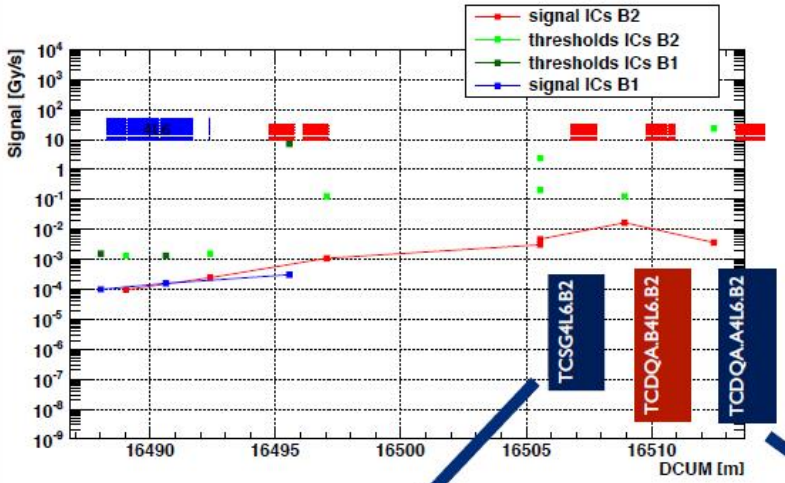
2.22E-6 BITS/p

~15% decrease due to space charge effects?

Presentation E. Nebot, LMC 24.8.2011



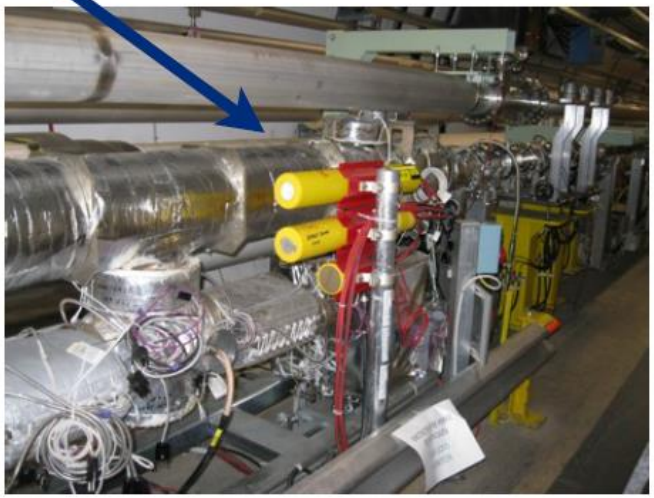
Location of the Direct Dump monitors



BLMs located downstream of TCSG.4L6 (4R6) and TCDQ.AL6 (AR6) for B2 (B1).

- TCSG. On the same support there are two ICs (one of them equipped with a 11ms filter) and one SEM.

- TCDQ. On the same support here is one IC and one SEM.



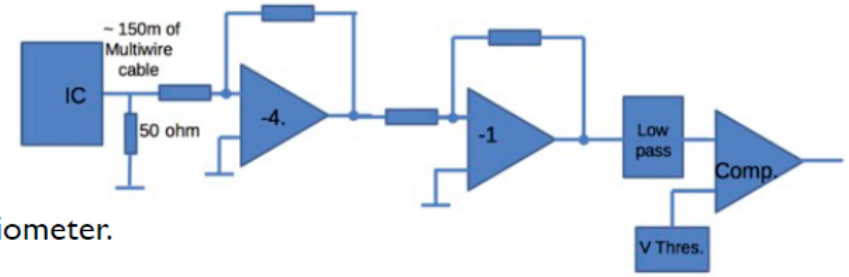
Direct Dump circuit and path of dump signal

Dynamic range
65536 bits => 10 V => 50mA

Current threshold
44590 bits (async dump)

Threshold modification
Manual increase of voltage in a potentiometer.
It requires one access.

IC + 2 Amps + Low pass Filter + comparator



- To be connected to LBDS during Technical stop
- VME installed in UA63 and UA67 in the rack MYGDP07 (belongs to TSU)
- Connection done with PCB plugged on the back of the VME