

MICE Beam Loss vs Particle Rate study run plan for 5th Nov 2009

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October 29, 2009

Purpose

To measure the particle rate in the MICE beam line as function of beam loss produced in ISIS, from a minimum of 100mV up to the maximum allowed, expected to be 2V.

Requirements and Conditions

- ISIS: note cycle rate and request they run their beam loss DAQ system
- Target ready with operator
- Detectors: GVA1, TOF0, TOF1. Note current position of GVA1 wrt DS and Q4. Ensure TOFs are setup to act as rate counters (JsG).
- Beamstop: use required for TOF1
- Trigger: TOF0, note prescaler value
- Rate counter: Primarily TOF1, but with TOF0 and GVA1 also, for backup, comparison with previous data and to observe their performance at high beam loss
- Optics: set to $\pi \rightarrow \mu$ or π beamline with DS on (see below). Hold constant throughout study and record current in each magnet.
- DAQ: enable DATE and target DAQ and verify they are recording. Use DATE online monitoring and target beam loss monitoring. Ensure DATE gate is correct width (record) and in correct place. Check the two DAQs' clocks are synchronised.

Performing the study

- Target: initially find 100mV level, then take data every $\sim 100\text{mV}$ up to 500mV, then every $\sim 250\text{mV}$ up to 1V and lastly every $\sim 500\text{mV}$ beyond. Use 300 - 400 pulses per beam loss setting. Gauge beam loss using sector 7 peak signal from target DAQ (rather than the bar chart screen, though monitor this too).
- DAQ: start a new run for every beam loss setting. If anything significant changes during a run, start a new run at the same beam loss setting.

Notes

- If Cerenkov's are functional enable them for extra PID, which may not be possible with the TOFs if they are being used as rate counters
- If TOFs can still do PID, look for muon rates using online monitoring while performing each run (as done by LC in previous study)
- Look for evidence of pile up in GVA1, TOF0 and TOF1 and note when it begins to take effect
- Record everything using the Run Conditions spreadsheet

Appendix: Magnet settings

Magnet	Current (A)
Q1	77.47
Q2	96.76
Q3	67.31
D1	233.54
DS	505.46
D2	77.38
Q4	128.55
Q5	172.40
Q6	114.22
Q7	107.86
Q8	163.08
Q9	139.11

Table 1: $\pi \rightarrow \mu$ beam line, DS on

Magnet	Current (A)
Q1	74.94
Q2	93.60
Q3	65.11
D1	225.25
DS	488.88
D2	115.35
Q4	195.51
Q5	262.20
Q6	173.89
Q7	176.70
Q8	267.45
Q9	228.49

Table 2: π beam line, DS on