

MICE Run Plan for 14th August 2010

- v1.1

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Purpose

To measure the particle rate in the MICE beamline as a function of beam loss produced in ISIS, from a minimum of 100mV up 10V, by varying the target depth. To investigate the effect of varying the target delay on beam loss and particle rate, in the region of 2V beam loss.

Personnel

MOM: Roumen Tsenov

BLOC: Henry Neberensky

Shifters: Adam Dobbs, Galina Vancova, Chris Heidt

Preconditions

1. ISIS: note rep rate and request they run their beam loss DAQ system.
2. BLOC to operate target, magnets, DS and beam stop.
3. Shifter to operate DAQ, record Run Conditions spreadsheet, Online Monitoring, etc.
4. Target expert on call to do stability check.
5. Detectors:
 - (i) BPM1, BPM2 - make sure they are working correctly.
 - (ii) Lumionsity Monitor - make it is working correctly and note gate width.
 - (iii) TOF0, TOF1 - there must be working TOF calibration present (or to be done in the near future), recorded together with the relevant cabling information - essential for later PID.

Performing the study

1. Set the beamline optics for positive $\pi \rightarrow \mu$ transport, remembering to use settings for DS on¹. Hold constant throughout the study and record the current in each magnet.
2. Set the trigger to TOF1 and note the prescaler value.
3. Power up the FNAL BPMs, Cherenkovs, GVA1, TOF0, TOF1, TOF2 as necessary and check Lumionsity Monitor is on.
4. Enabling DAQs 1:
 - (i) Check the DATE clock is synchronised with the target DAQ clock.
 - (ii) Load target DAQ software (Beam Loss monitor).
 - (iii) Load DATE DAQ software.
5. Load FNAL BPM profile monitor software (including the servers) and check works.
6. Setup Target:
 - (i) Set up as per instructions.
 - (ii) Do target stability check if necessary.
 - (iii) Set beam loss using R8BLM1 of new ISIS readout and LCD screen readout. Also note BLM7SUM Integral value.
 - (iv) Move to minimum beam loss level using target depth.
 - (v) Set early short delay so that target is still intercepting ISIS beam well when moved to deeper depths, and is not scrapping next ISIS cycle. Re-adjust depth to get correct beam loss again. Record short delay and keep constant for rest of the depth study.
7. Enabling DAQs 2:
 - (i) Set gate width to 0.5ms. Ensure this covers the correct part of the MICE spill and works for whole set of beam loss settings (remember the swing of the target parabola).
 - (ii) Check data is successfully being written to disk, both from the target DAQ and DATE DAQ.
8. Monitoring the beam:
 - (i) Load the Online Monitoring and observe the beam profile and TOF reconstruction, including beam centering. If possible produce actual TOF plots on the fly using Online Reconstruction and look for rates of individual species and record by hand for each beam loss setting.
 - (ii) Observe the beam profile and rates in the FNAL BPM monitors.
9. Taking data:

¹See Appendix for magnet settings.

- (i) Perform a 'standard run' using settings in Run Conditions spreadsheet.
 - (ii) Target depth study: take data at pedestal (target out of beam), 100mV, 500mV, 1V, 2V, 3V, 4V, 5V, 6V, 7V, 8V, 9V, 10V taking 200 pulses per setting. Check DAQ gate is still good periodically.
 - (iii) Target delay study: move to 2V using target depth. Perform runs at 5 delay settings with 200 pulses per setting. Do not exceed 3V beam loss.
 - (iv) Add more or less points depending on time available. Number of pulses per setting may also be reduced - 100 pulses being the minimum.
 - (v) Record by hand loss in BLM7SUM, target depth, neutron monitor levels in DSA and take 4 screenshots of new ISIS BLM display, for each setting.
10. Running DATE DAQ:
- (i) Create a new run for every beam loss setting. If something changes, like an ISIS trip, start a new run with the complete total number of pulses.
 - (ii) DATE automatically stops when a run reaches a certain data size. Watch for this and if necessary spread a particular beam loss setting over more than one run.
 - (iii) Check for evidence of pile up in GVA1, BPM1, BPM2, TOF0, TOF1, TOF2 or DAQ overload.
11. Be thorough in filling out the Run Conditions spreadsheet.
12. Time Estimate: 50Hz running: 2hr to set up. $200 * 2.5s$ per setting = 500s \sim 8mins. 2mins to change target settings. \sim 20 settings. 1hr to shutdown. \rightarrow 6hr 30min total.

Appendix - Magnet Settings

6mm, 200 MeV/c M0 optics:²

Magnet	Current (A)
Q1	102.38
Q2	127.91
Q3	89.00
D1	323.15
DS	668.63
D2	94.15
Q4	158.10
Q5	212.02
Q6	140.57
Q7	138.67
Q8	209.82
Q9	179.18

²Produced by Marco Apollonio, see http://mice.iit.edu/wiki/index.php/Beamline_Optics