MICE Beamline Status
(March 18, 2008)

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Outline

• Background
• Estimated particle rates from simulations
• Beamline Monitor layout
• Pictures of the MICE Hall and ISIS Vault
• Report of first MICE beam time, March 14-15
• Future plans (March – April)
Background

- MICE Beamline intensity is directly related to the protons on target (PoT)
- Protons on target is limited by:
  - Permitted ISIS losses
  - Target heating (not a problem at present)
- For now, ISIS losses are limited to rather low values, due to uncertainty in the activation of ISIS components
- At present the limit is 50 mV in the Sector 7 Beam Loss Monitor
  - That corresponds to a few $10^9$ protons on target
  - That is almost a factor of 1000 lower than the design “baseline”
- Due to the low limit on PoT, the decision was made to initially bring up the beamline for protons
  - Factor of ~10 more protons than everything else
  - Protons of such low momenta are “fragile” – they range out easily
Particle Rates from G4beamline Simulation

TOF0 Singles for 4E12 Protons on Target
B1 = B2, All Quads Off

<table>
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<th>Momentum:</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
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<td>Proton</td>
<td>0</td>
<td>600 *</td>
<td>5900 *</td>
<td>6700 *</td>
<td>9800</td>
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<td>13700</td>
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<tr>
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<td>425</td>
<td>724</td>
<td>1248</td>
<td>1792</td>
<td>1702</td>
</tr>
<tr>
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<td>144</td>
<td>183</td>
<td>248</td>
<td>406</td>
<td>558</td>
<td>429</td>
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<tr>
<td>e+</td>
<td>41</td>
<td>60</td>
<td>31</td>
<td>30</td>
<td>38</td>
<td>46</td>
<td>1</td>
</tr>
</tbody>
</table>

* Simulation had thinner vacuum windows, no air, and no BC1/BM1 – these protons may range out before TOF0 (depends on total material in beam).

Divide by ~1000 for a few 10⁹ PoT.

We will be negotiating for more protons on target…
MICE Beamline Detectors
After ISIS Shutdown (~1 April)
MICE Hall
(Feb. 20, 2008)
Manual Operation of MICE Target
Radiation Survey in ISIS Vault
First MICE Beam Time
March 14-15

• We were granted several shifts during ISIS study time, Friday-Saturday
• Friday was spent getting magnets to work, and final setup of the target; no beam in ISIS.
• D1 was working, then its power supply burned out two resistors; unable to replace them on the weekend.
• Q1 and Q2 power supplies failed due to water damage.
• So there were no magnets powered up in the MICE beamline.
• Target was tested with beam on Saturday.
MICE Initial Target Test

- Given permission for a maximum of 5000 actuations.
- Performed 3679 actuations, 3654 with the gate valve open.
- Ran target at 0.4 Hz to minimise cooling issues and to maximise time to adjust parameters.
- Target hold position $T = 35 \, ^\circ\text{C}$. Actuate (0.4 Hz) $T = 55 \, ^\circ\text{C}$
- Tested the time delay and depth control mechanisms.
- Scanned parameter space to find optimum delay time and dip depth.
- Optimum depth $\sim 45 \, \text{mm}$ reproducible.
- Optimum delay 5.9 (ms) from trigger 10 ms before injection
- Problem with trigger - GMS – from ISIS - solved.
- Problem with ADC for beam loss signal not solved.
- Tested target in 50/128 mode and saw that we could extract target in time to miss following ISIS pulse.
- Happy with performance of target……………. 
Target Timing

- Target Depth
- Circulating beam
- Trigger (ISIS Timing) [pulse is invisible]
- Beam Loss (all sectors)

MICE Target loss only at end of beam cycle
MICE Target made it out before next beam cycle
Future plans (March – April)

- ISIS is in shutdown until March 27
- During shutdown, access to MICE Hall and DSA are unrestricted
- Concrete ramp removal continues in MICE Hall, as well as other infrastructure installation
- Intent is to fix all installed MICE beamline magnets: D1, D2, Q1-Q6, and get them powered up
- Decay Solenoid status not certain (depends on refrigerator contractor); transfer line still needs to be moved.
- Intend to also get DAQ problems resolved and be able to take data for: target, ISIS beam loss monitors, MICE beam monitors and counters
- We expect several shifts, April 1-3, to begin commissioning the beamline
This is an exciting time for MICE!
There is lots to do!
Come join us!