

MICE Beamline Status (March 18, 2008)

Tom Roberts

Muons, Inc.

Illinois Institute of Technology

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

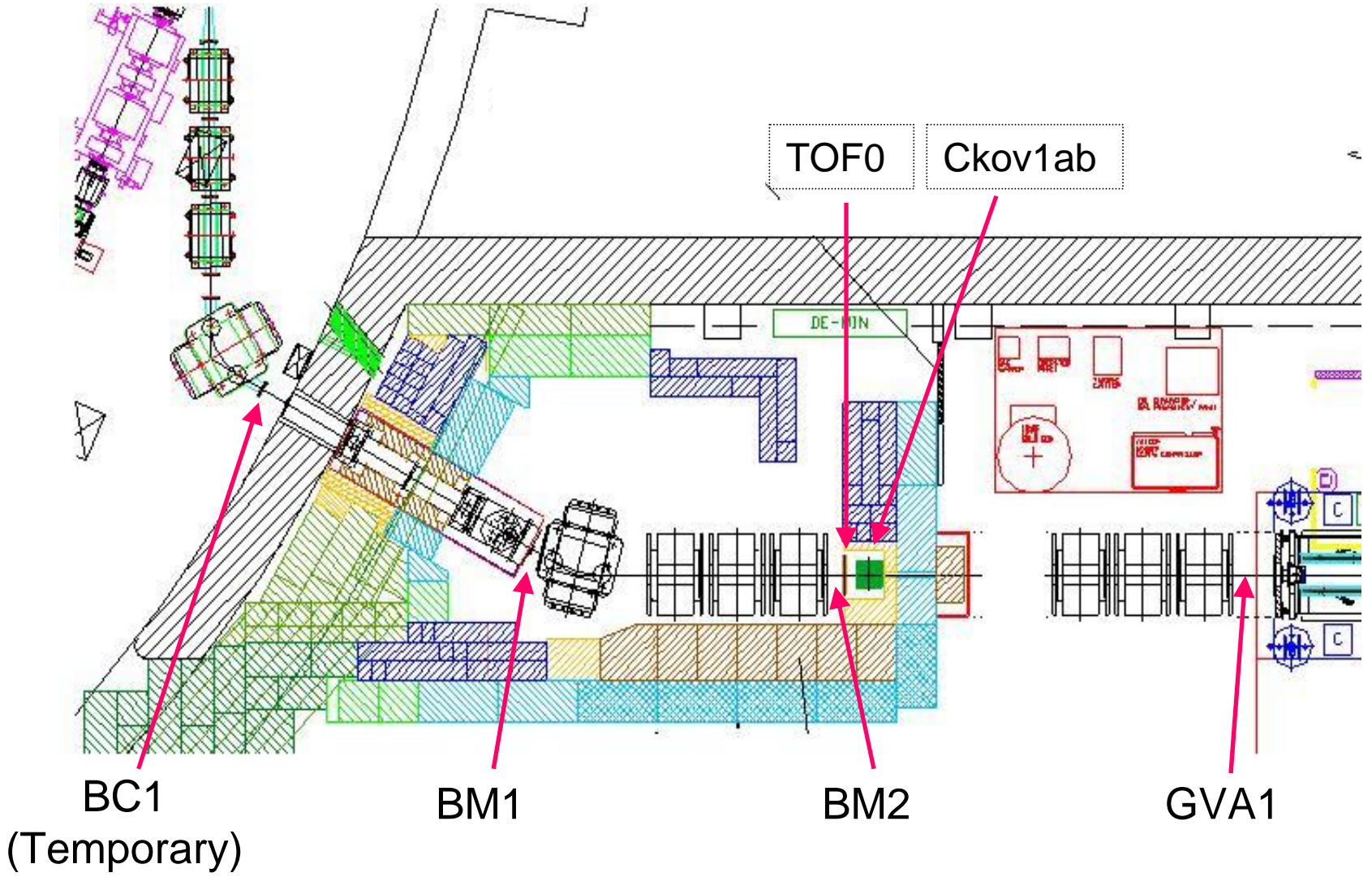
Momentum:	200	250	300	350	400	450	500
Proton	0	600 *	5900 *	6700 *	9800	11700	13700
pi+	235	298	425	724	1248	1792	1702
mu+	109	144	183	248	406	558	429
e+	41	60	31	30	38	46	1

Divide by ~1000 for a few 10⁹ PoT.

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

We will be negotiating for more protons on target...

MICE Beamline Detectors After ISIS Shutdown (~1 April)



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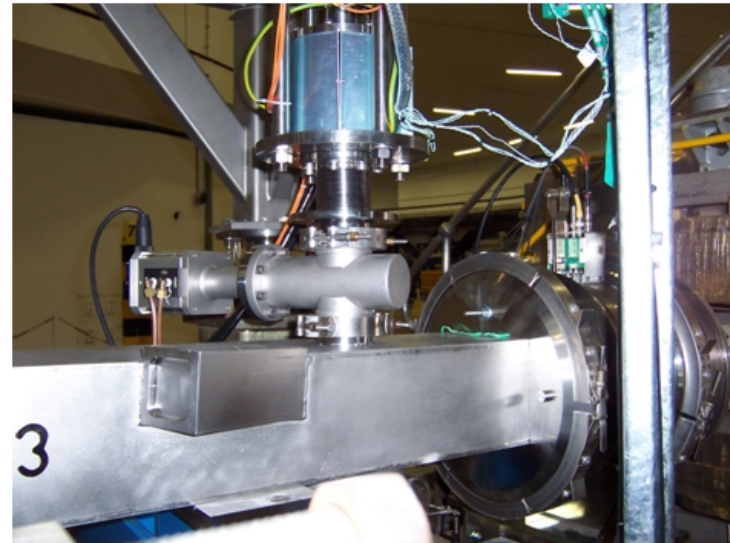
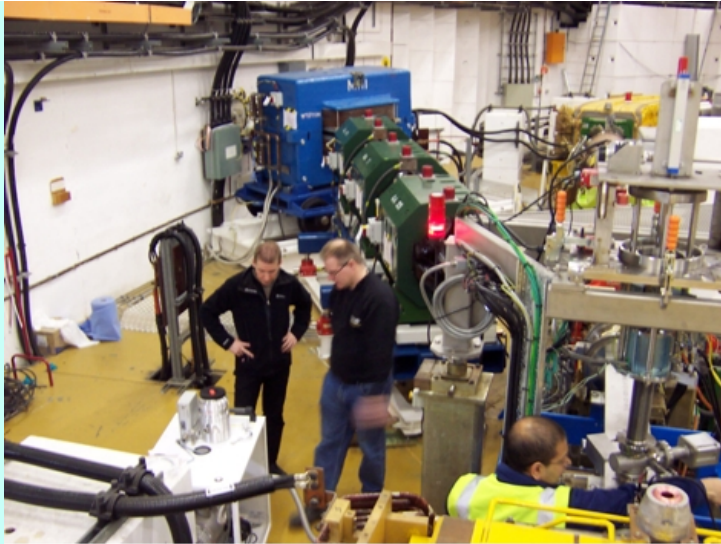
MICE Hall (Feb. 20, 2008)



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MICE Beamline Status

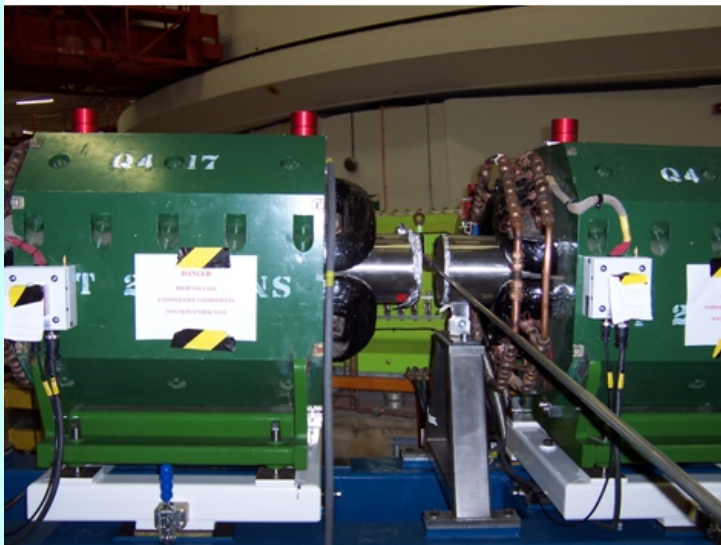
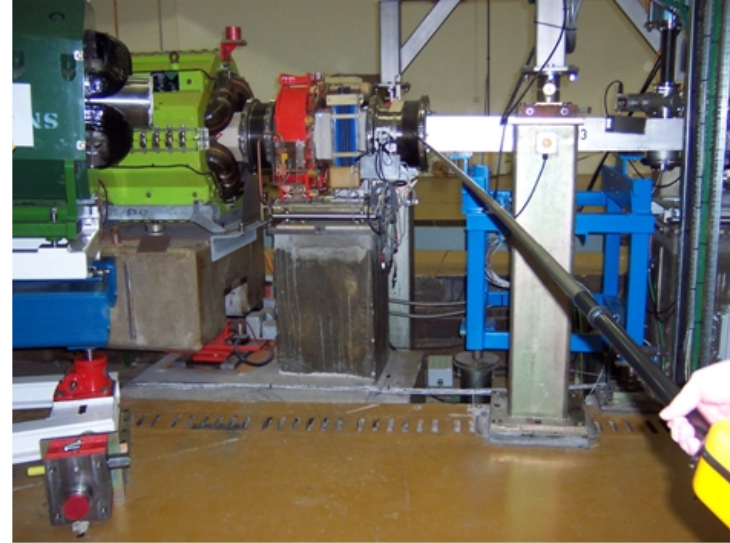
Manual Operation of MICE Target



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Radiation Survey in ISIS Vault



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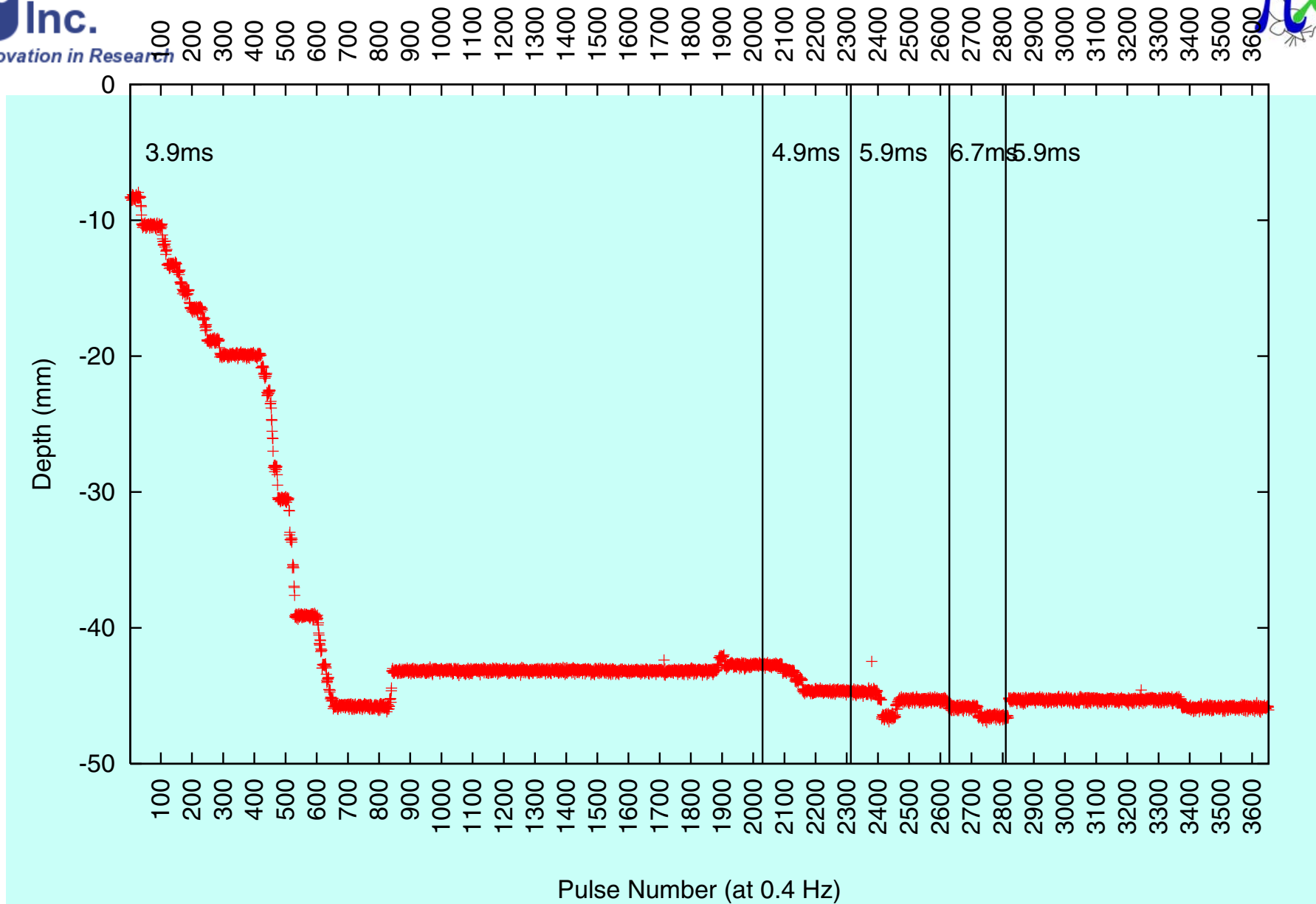
First MICE Beam Time March 14-15



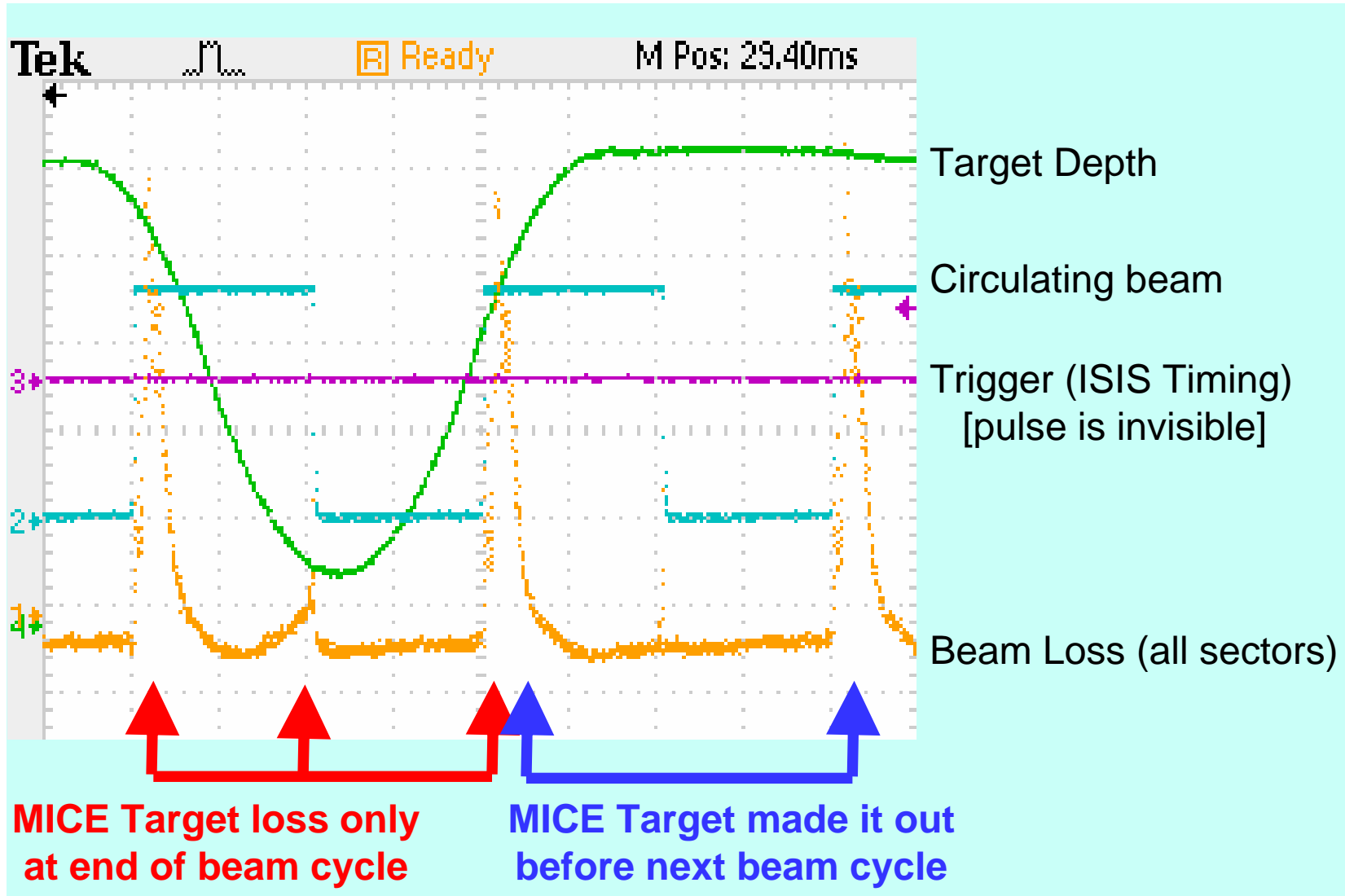
- We were granted several shifts during ISIS study time, Friday-Saturday
- Friday was spent getting magnets to work, and final setup of the target; no beam in ISIS.
- D1 was working, then its power supply burned out two resistors; unable to replace them on the weekend.
- Q1 and Q2 power supplies failed 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 $T = 35$ C. Actuate (0.4 Hz) $T = 55$ C
- Tested the time delay and depth control mechanisms.
- Scanned parameter space to find optimum delay time and dip depth.
- Optimum depth ~ 45 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



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!