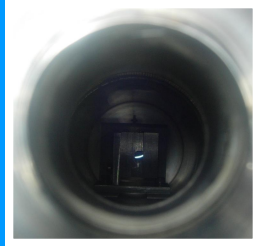


T-980



Crystal Installation, Commissioning and Early Study Plans

Dean Still

August 6, 2008

Crystal Installation



- Current Status of Crystal Assembly:
 - All mechanical modifications to the crystal assembly have been completed.
 - All motion control and instrumentation has been tested under vacuum- laser as well.
 - Crystal assembly has been vacuum certified and pre-baked ready for installation.

- Installation Involves: (Tev Mechanical and survey group)
 - Stage equipment in the tunnel: 2 hours
 - Vent with N2, unbolt 2 flanges and remove spool: .5 hours
 - Install Crystal: 1 hour
 - Make up flanges loose with copper seal: .5 hours
 - Survey: 2-4 hours
 - Final torque 2 flanges: .5 hours
 - Pump down and rough leak check: 2 hours
 - Turn on Ion Pump and final leak check: 2 hours
 - Remove equipment from tunnel: 1 hour

 - Verify operation crystal Hor, & Ang. motion control & instrumentation. (A. Legan)
 - Install & verify operation of laser. (T. Johnson)

Total 10 – 12 hours

This procedure has been successfully completed 3 times before in ~ 10 hours.

Crystal will be installed at earliest appropriate downtime or Oct short shutdown.

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Crystal Commissioning

Crystal Collimator Commissioning Estimate 2008		
Commission Task	Shifts	Personnel
Prebeam Testing:		
Crystall Tunnel installation		Tev mech group
Laser installed and controls tested to MCR (start w/ wide detector)		T. Johnson
All beam instrumentation installed and controls tested to MCR		Johnson, Tesarek, Zagel
Hor. & Ang. motion control installed and tested to MCR		Legan
Final alignment confirmed (provide lbseq25 helix values)		Survey, Still
Add new feedback devices to application C10 and rebuild		Still
Scintillator detectors and flying wire currently working and taking data		Tesarek, Zagel
150gev Beam Tests: (Conducted in Downtime and Shot Setup)		
Scan crystal Hor and Ver with beam to find center. Record	0.125	Still
Test angular motion control using feedback	0.125	Still
Test horizontal motion control using BLM/PIN feedback to stop motion	0.125	Still
980gev Beam Test : (EOS or proton only)		
On Proton helix & lbseq25 - Find center of crystal hor and ver with beam !!	0.25	
Angular scans to determine channel. (EOS)	0.5	Still
Verify baseline for Instrumentation FW,SD,BLM,PIN in channel	0.25	Johson, Tesarek, Zagel, Shiraishi
With crystal channeling - intercept wit E03 collimator. Record efficiency	0.25	Still
Test channel setup for future automated use at beginning of store	0.125	Still
980gev Lowbeta- Proton/Pbar EOS Study Program:		
Ready to demonstrate beam goals for T-980		
	Total shifts	
	1.75	

Crystal Early Study Plans

T-980 has requested 12-20 hours(6 to 10 - 2 hours periods) of EOS to reach the following goals:

- Measure channeled, volume-reflected and scattered beams as well as beam losses (radiation levels) downstream of the crystal setup in comparison with simulations.
- Demonstrate reproducible beam loss reduction in the B0 and D0 in comparison with simulations, aiming at a routine use of the crystal based collimation in the Tevatron stores.
- Develop optimal crystal/goniometer/instrumentation system for one- and two-plane collimation exploring and exploiting novel crystal technologies and newly understood phenomenon, volume reflection.
- All of the above in conjunction with the CRYSTAL experiment at CERN SPS, aiming at a Phase II crystal-based collimation system for the LHC (performance, reduced impedance and heavy-ion option)

To date: crystal EOS have conducted ~ 40+ hours of successful studies.

Common Historical Concerns

Beam damage event on Dec 5, 2003

- Where non-standard motion control device lead to damaged components.

Protection differences from Dec 5 and Studies:

- Implemented QPM fast aborts. (1-2msec abort compared to 16msec abort 2003)
- CDF Implemented diamond BLM abort capabilities.
- Continue to provide collimators as limiting aperture for beam tests.
- For crystal case – primary location is at E0 with secondary at correct phase.
- CDF and D0 will not have silicon on during time crystal is moving.
- Crystal uses standard motion FNAL control with recently improved mechanics as presented by R. Reilly.

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Extra Slides

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Crystal Collimator System

