T-980: 2009-2010
(What I would do)
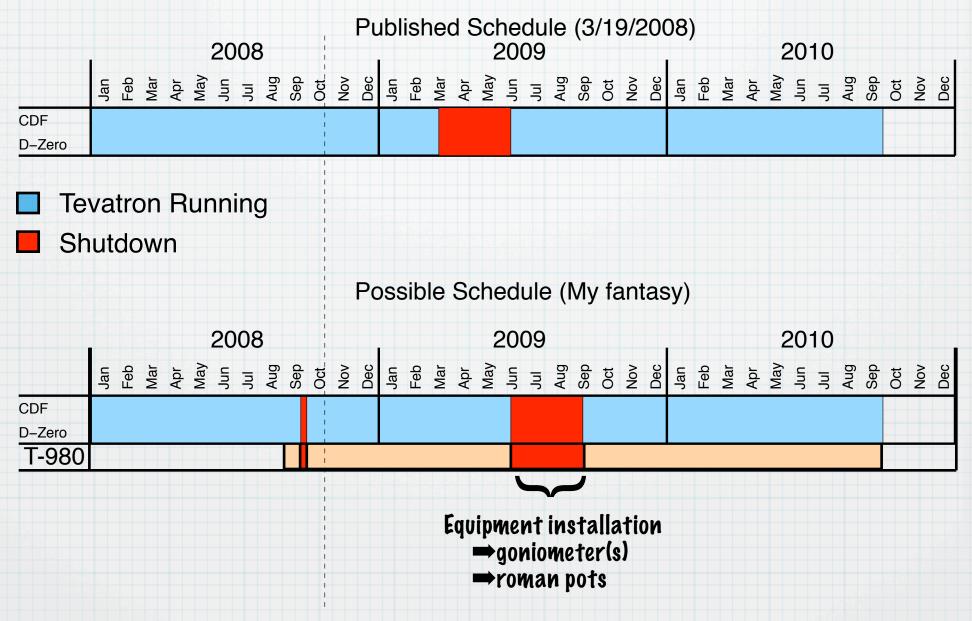
R.J. Tesarek
Fermilab
10/29/08

My Point of View

Q: Will a bent crystal collimation system work in an accelerator/collider facility and under what conditions?

- Prove feasibility of system under "battle conditions"

  ✳ minimal instrumentation

  ✳ automatic & routine deployment of system

- Establish "operational/engineering criteria" for future such systems

  ✳ reproducibility, reliability

  ✳ performance stability

Focus on work at the Tevatron

Test beams for determining optimal crystal configuration

Goals: 2008 Calendar Year

Routine operation of crystal to reduce losses at CDF/Dzero

- ✓ re-establish channeling of "O" shaped crystal

- ✓ establish reproducibility of crystal behavior

- • re-establish reduction of losses at CDF/Dzero

- • establish "crystal scraping" at beginning of store

- • full store to control losses at CDF/Dzero

- • routine use of crystal to control losses at CDF/Dzero

- • understand crystal behavior/performance from underlying physics

Accelerator Schedule

Published Schedule (3/19/2008)

Tevatron Running
Shutdown

Possible Schedule (My fantasy)

Equipment installation
➡ goniometer(s)
➡ roman pots

We are here

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Goals: 2009 Calendar Year(1)

Measurement of accelerator wide loss pattern

- understand abort gap/bunch behavior

Measure long term crystal performance

- collimation efficiency (loss reduction at CDF/Dzero)

Simulate effect of crystal accelerator wide

- reproduce H-8 data in simulation

- confirm simulations reproduce measured loss patterns for existing collimation system (full Tevatron)

- confirm simulations reproduce from x-tal, full accelerator

Antiproton channeling?

Goals: 2009 Calendar Year(2)

Establish 2-dimensional collimation system

- install 2nd goniometer at E0
- confirm loss reduction away from E0
- routine operation of 2nd system

Measure single particles trajectories (turn-to-turn)

- install Roman pots and goniometer (Czero?)
- measure particle distributions/trajectories in halo (turn-to-turn)

Measure multi-turn behavior of crystal

- confirm channeling in crystal

Test other (optimal?) crystal technologies

Goals: 2010 Calendar Year

Establish 2-dimensional collimation system

- routine operation of 2nd (vertical) system

Measure single particles trajectories (turn-to-turn)

- measure particle distributions/trajectories in halo (turn-to-turn)

- confirm simulation of multi-turn distributions/behavior

Measure multi-turn behavior of crystal

- measure particle distributions/trajectories in halo (turn-to-turn) with crystal

- confirm simulation of multi-turn distributions/behavior

Test other (optimal?) crystal technologies

Summary

On our way to establishing 1st crystal collimator in working accelerator/collider facility (not a study).

Experimental directions at Fermilab should focus on how to use crystal collimator for routine operation of accelerator/collider facility.

Simulations tuned on test beam data and confirmed with Tevatron experiment data.