

# Conclusions - Action items

ALL

**CDF/D0/AD luminosity meeting  
of November 1, 2005**

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# Conclusions – Action items

- The error in beta function measurements using the response matrix fit method with the new BPM system for the Tevatron is now approximately 5%. Beta\*x is currently 30.3 cm at CDF and 29.2 cm at D0, and beta\*y is 29.1 cm at CDF and 28.2 cm at D0 (waist minima). With the new (28 cm) Tevatron lattice, the initial luminosities had an increase of the order of 10% at both CDF and D0 for the same number of protons and pbars. CDF measurements of the beam waists indicate that recent alpha bumps at CDF have moved the z position of the beam waist by the expected amount. The Tevatron group is performing studies on new working points, on reducing D0 losses at the end of squeeze, on tuning the helix and on improving lifetimes.

# Conclusions – Action items

- The CDF/D0 luminosity ratio has been reduced from  $\sim 1.15$  to  $\sim 1.11$  after the implementation of the 28 cm lattice and the attempt to equalize both IPs. (Within  $\sim 3\%$ , the CDF and D0 IPs are now expected to be equal). This ratio exhibited a small dependence on luminosity after March 2005, and there are indications that it is “flatter” during the month of October, when the new D0 luminosity electronics started being used. We will continue to monitor this ratio as well as how measured and calculated luminosities compare with the new Tevatron lattice.
- D0’s new luminosity electronics became the default since the end of store 4460, Oct. 20, 2005, and they are essentially free of the deadtime and the dynamic range problems of the old system. D0 is in the process of

# Conclusions – Action items

re-evaluating the absolute scale of the luminosity, and the expectation is that it will be finalized by the end of 2005.

- CDF finds good linearity dependence between the luminosity measurement and the currents of the central outer tracker. By studying bunch by bunch information in high luminosity stores they also find good linearity dependence between CDF (measured) and AD (calculated) luminosity up to the  $\sim 8$  interactions per crossing, which corresponds to  $L \sim 2.3 \text{E}32 \text{ cm}^{-2}\text{s}^{-1}$ . They want to study with more statistics the region between 7-8 interactions per crossing. They expect that the CLC performance will be improved after the replacement of some aging PMTs during the upcoming shutdown.

# Conclusions – Action items

- CDF is investigating some discrepancies between their online beam width fitter and the corresponding offline measurement ( a few % in central value). A more realistic  $z$  distribution for track pairs in half-SVT barrels is under investigation and it will hopefully help in reducing the discrepancies. Some ideas on reducing the statistical error of the online measurements are also being investigated.

# Conclusions - Action Items

- The D0 offline measurement of  $\beta^*$  indicates that the  $\beta^*x$  and  $\beta^*y$  values have been reduced according to expectations after the implementation of the 28 cm lattice.  $\beta^*x$  and  $\beta^*y$  are now more equal to each other, again according to expectations. A bunch by bunch comparison between measured and calculated luminosities for high luminosity stores is also being studied.

# Conclusions - Action Items

- Both CDF and D0 indicated that they experience some difficulties as instantaneous luminosities keep rising. The high luminosities helped them identify (and address) features of their trigger and DAQ systems which appear only at high inst. luminosities. Most of the problems are being addressed by trigger table improvements. The experiments are mainly interested in maximizing the integrated luminosity. They are also interested in understanding their trigger issues now so that they can be prepared to run at even higher inst. Luminosities. D0 expressed an interest in more equal bunch by bunch intensities, to make it easier to deal with some

# Conclusions - Action Items

nonlinearities in trigger rates.

- Now that we have significant amount of statistics in high luminosity stores, for the next meeting it would be very nice to see cross sections of some physics processes (event rates, detection efficiencies...) as a function of luminosity.
- Our next meeting is being planned for around mid January 2006.