

Conclusions - Action items

ALL

**CDF/D0/AD luminosity meeting
of July 20th, 2005**

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Conclusions – Action items

- The direct measurement (model independent) of β^* at the CDF and D0 IPs using the new Tevatron BPM system looks promising and has currently an accuracy of a few %. It was performed using two proton data sets designed for other studies and indicates that the β^* s have values close to the design values of 35 cm. This measurement will be improved by performing further dedicated studies, by understanding better the BPM scaling and by introducing transverse coupling. It was also pointed out that beam-beam

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interaction effects can change (decrease) β^* on the order of 10% .

- The response matrix fit method with the new BPM system for the Tevatron allows to pinpoint relative gradient errors in the Tevatron of the order of $2E-3$. The error in beta function measurements is now approximately 5%. The lattice measurements (using proton beam only) indicate that β^y is smaller than β^x for both IPs as indicated by the CDF and D0 measurements as well. The β^* values are smaller at CDF in comparison with D0 by about 10% (the effect in luminosity is smaller because of the hourglass factor). On the basis of the fitted model there will be an optics modification

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in the next few weeks to correct beta-beating in the arcs, to eliminate the difference between CDF and D0 and to decrease β^* at the IPs from 35 cm to 28 cm. The new lattice parameters will have to be propagated in all the emittance calculations as well.

- D0's new luminosity electronics are online since May 2005 and they are being checked out so that they can become the default. D0 is in the process of re-evaluating as well the absolute scale of the luminosity. All corrections are expected to be implemented by the end of August 2005.

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- The new CDF online beam width fitter is up and running since the end of June and reporting to ACNET. Several operational problems are now fixed. A more realistic z distribution for track pairs in half-SVT barrels still needs to be implemented. The recent online beam widths need also to be compared to the offline calculations for the same time period. The discrepancy in β^*y between the online and offline methods has now been reduced and is being studied further.

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- The D0 offline measurement of β^* indicates that the interaction point is stable and the β^*x and β^*y values did not change significantly in the past few months (there was a small increase in β^*y during the past couple of months). During a store there is no definite pattern for β^*x and β^*y but they vary between 31 to 36 cm and 33 to 39 cm respectively. D0 is in the process of making absolute value comparisons between accelerator measured emittances and fitted emittances from the β^* studies. A bunch by bunch comparison between measured and calculated luminosities was also performed. Some interesting features were noticed in some

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stores in the edges of the 12 bunch pbar train.

- There was a discussion on if the luminosity measurement precision reported by the experiments could be improved by using the process $ppbar$ going to $ppbar$ and $l+l-$ via double photon exchange. The advantage of using this process is that its cross section is known very well theoretically. There are several acceptance related complications though and there is more evaluation under way.

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- Our next meeting will be planned for around mid September (after D0 has updated their luminosity measurement and after implementation of the new beam optics for the Tevatron).