Polarized Proton Luminosity Improvements

February 29, 2008

Tighter β^*-squeeze

- $\beta^* = 67\,\mathrm{cm}$ was tested during Run-8.
- Luminosity lifetime/beam lifetime at store are uncertain.
- Initial β^* value for Run-9 needs to be discussed.
- $30 - 40$ percent luminosity increase seems realistic.

Nonlinear chromaticity correction

- Eliminate tune spread from nonlinear chromaticity, then fill up this space by beam-beam.

- Should be applied during Run-8 – do we get time?

- 20 – 30 percent luminosity increase.

9 MHz cavity

- Reduce longitudinal emittance by factor 2, bunchlength by factor $\sqrt{2}$.
- Shorter bunches improve hourglass factor.
- Longer bunches on the ramp also reduce transverse emittance blow-up due to lower density/peak current.
- Common cavity will lock bunches on the ramp - avoids long-range beam-beam.
- $20 - 30$ percent luminosity increase (at $\beta^* = 1.0\,\mathrm{m}$).