Update Run-7 $\vec{p} - \vec{p}$ and d – Au

Christoph Montag

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Polarized Protons Goals

parameter	achieved in Run-6	goal for Run-7	factor
# of bunches	111	111	1
protons/bunch	$1.35 \cdot 10^{11}$	$1.75 \cdot 10^{11}$	1.7
β^* [m]	1.0	0.9	1.1
emittance [μm]	18	15	1.2
$\mathcal{L}_{\text{store avg.}}$	$20 \cdot 10^{30}$	$40 \cdot 10^{30}$	2

Bottleneck: Beam-beam

Ramp configuration for p-p

- Injection at $G\gamma = 45.5$
- β^* : 10 m at injection, 0.9 m at store
- For current working point: low-γ_t injection lattice, tune swing on the ramp (.72 $\rightarrow$ .68)
- For near-integer working point: regular injection lattice (γ_t-quads off), tunes below integer (27.92/28.93)

Improvements for Polarized Protons

- $Q_x = 2/3$ resonance compensation (Yun, Johan)
  – requires driving term measurements

- Nonlinear chromaticity correction (Steve, Yun)
  – 8 sextupole families instead of 2
  – tracking studies underway to check dynamic aperture
  – operational issues (how to change linear chromaticity without introducing non-linear chromaticity)

- Eliminate 10 Hz beam-beam modulation (C. M.)
  – will become operational at the start of the gold run
  – further improvements planned during the run

- Near-integer working point (C. M.)
  – tracking studies underway to determine dynamic aperture

Deuteron-Gold Goals

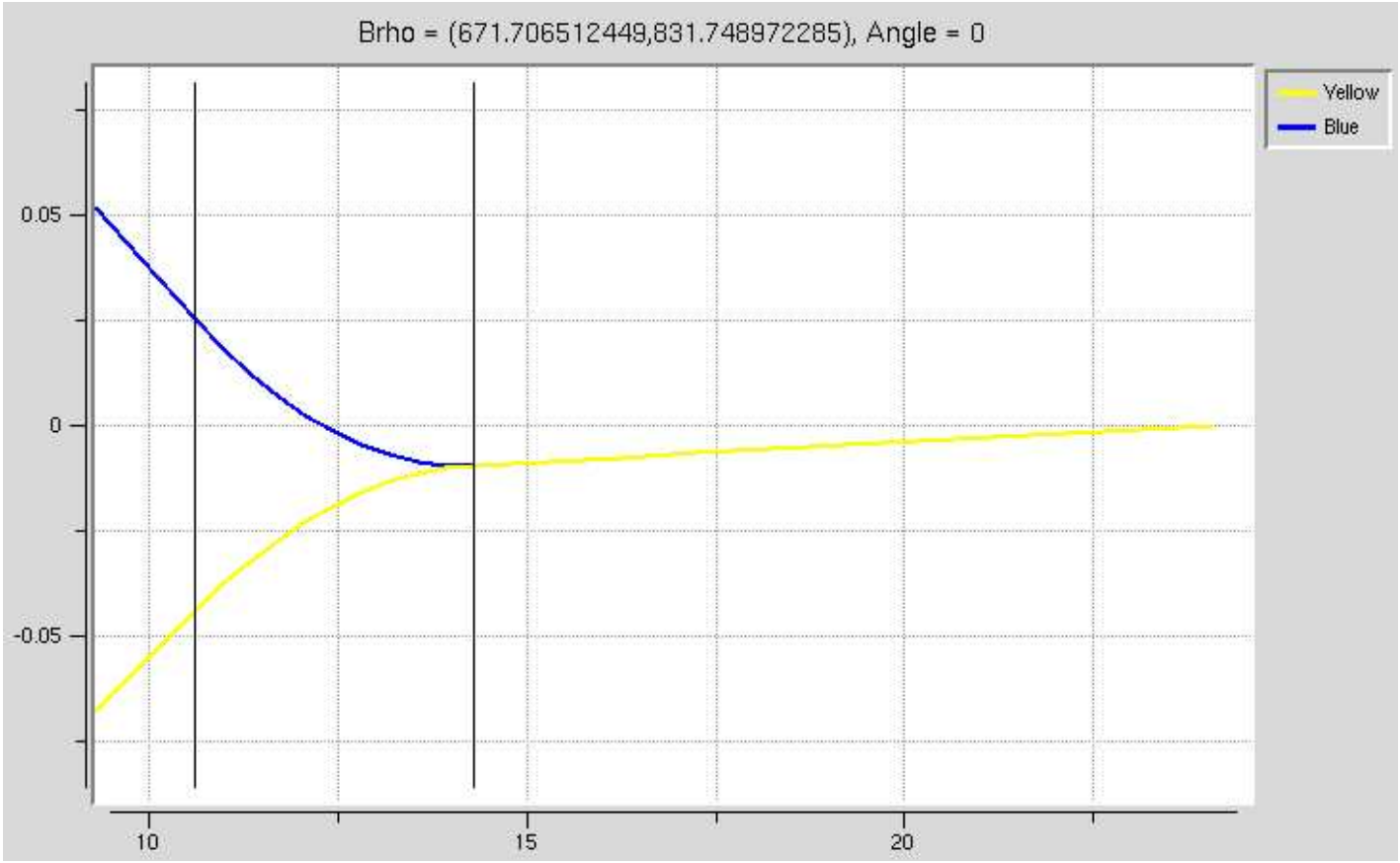
parameter	Run-3	Run-7	factor	remarks
# of bunches	55	111	2	Run-6/7
deuterons/bunch	$1.1 \cdot 10^{11}$	$1.4 \cdot 10^{11}$	1.3	Run-6
gold ions/bunch	$0.7 \cdot 10^{9}$	$1.1 \cdot 10^{9}$	1.6	Run-4
β^* [m]	2.0	1.5	1.3	
emittance [μm]	15	15	1	Run-3
$\mathcal{L}_{\text{store avg.}}$	$2 \cdot 10^{28}$	$7.5 \cdot 10^{28}$	3.8	

Bottleneck: Instabilites at transition

Ramp configuration for d-Au

- Injection at equal γ to avoid modulated beam-beam on the ramp
- β^* : 10 m at injection, 5 m at transition, 1.5 m at store
- Inherit Au ramp from Au – Au run (DX setting needs to be modified)

IR geometry for d-Au



Common orbit angle to accomodate different $B\rho$ at equal γ

Improvements for Deuteron-Gold

Most goals (will) have been achieved in previous proton or heavy ion runs, for instance due to installation of NEG pipes since 2003 d – Au run.
Further studies of limitations:

- Study transition instabilities (Vadim)
- Understand intensity limitations (S.Y.)
- Improve transition instrumentation (Mike)

Dry Run Activities

- Species ($\vec{p} - \vec{p}$ vs. d − Au) will be decided during the Au − Au run

- Specific items for both species should be tested during Au − Au Dry Run:
  – polarimeters (Haixin)
  – tape for mode switching (Jen)

Conclusion

- Preparation has so far focused on $\vec{p} - \vec{p}$ run, since this is the default for Run-7

- Achieving luminosity goal with protons requires new lattice configuration (working point, sextupole scheme, resonance compensation); tracking studies in progress

- d − Au goals based on past performance with protons and heavy ions, assuming that Run-7 goals with Au − Au can be reached