



Instrumentation brain-storming

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WP2 meeting

IP orbit feedback

Today the machine is sufficiently reproducible not to need an orbit feedback at the IP. For HL-LHC it might not be case for the lowest value of β^* possible.

$$X_{\text{measured}}(t) = X_{\text{true}}(t) + O_{\text{error}}(t, I_b, \dots)$$

$\text{Std}(X_{\text{error}}(t, I_b, \dots)) < 2 \mu\text{m}$ when

- sampled at 10 Hz for the 36000 consecutive samples (10 hours)
- $0.5 \cdot 10^{11} < I_b < 2.2 \cdot 10^{11}$, $|X_{\text{true}}| < 15 \text{ mm}$
- samples should be delivered to the feedback DSP within 20 ms delay

AC Dipole optics measurement

Today amplitude data from AC dipole measurements is not sufficiently accurate to measure β -function in the Q1-Q4 areas as compared with K-modulation. Amplitude data would allow much faster optics measurements if available.

$$\text{DFT}(X_{\text{measured}}(t), \omega) = S_{\text{error}}(\omega, I_b, \langle X \rangle, \dots) \text{DFT}(X_{\text{true}}(t), \omega)$$

$$|S_{\text{error}}(\omega, I_b, \langle X \rangle, \dots) - 1| < 0.02 \text{ and} \\ \text{phase}(S_{\text{error}}(\omega, I_b, \langle X \rangle, \dots)) < 0.0001$$

- 16384 sample turn by turn samples for:
- $0.8 \cdot 10^{10} < I_b < 1.2 \cdot 10^{10}$, $|X_{\text{true}}| < 15 \text{ m}$
- $0.1 < \omega < 0.4$
- Few single bunches