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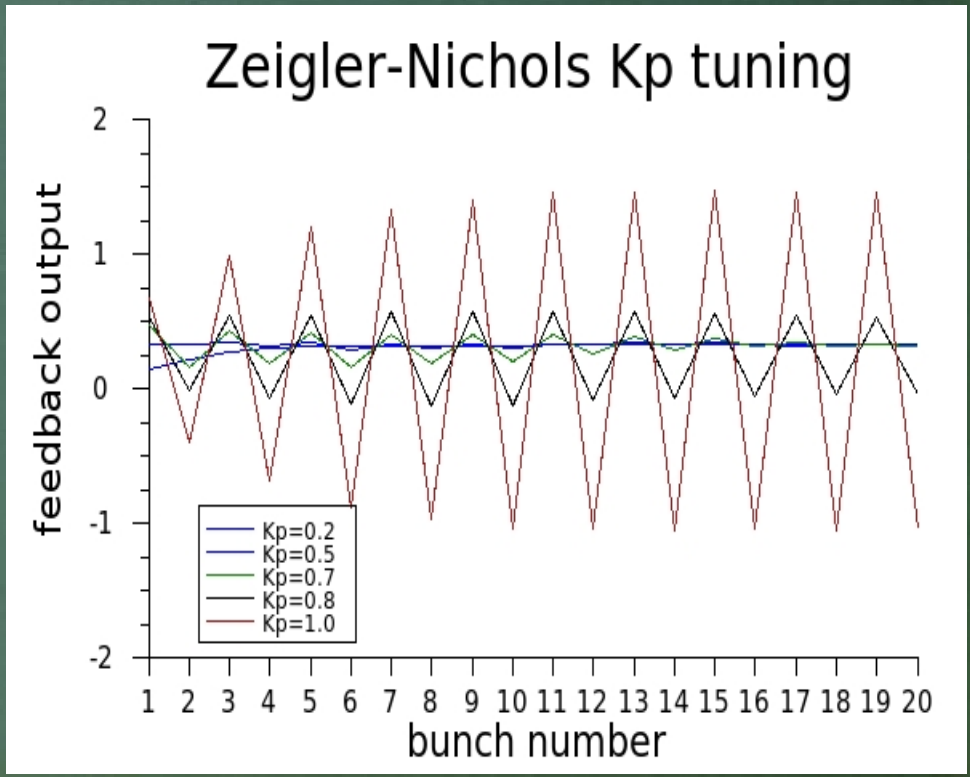
PI Controller & tuning

For Bunch n

$$F_{kick}(n) = F_{kick}(n-1) + (K_p + K_i).IP_{off}(n) - K_p.IP_{off}(n-1)$$

Tune Kp and Ki using Zeigler-Nichols method

- Set $K_i = 0$ and increase K_p until ($K_p = K_c$) where output starts to oscillate with period P_c
- Then $K_p = 0.45\ K_c$ and $K_i = 1.2K_p / P_c$



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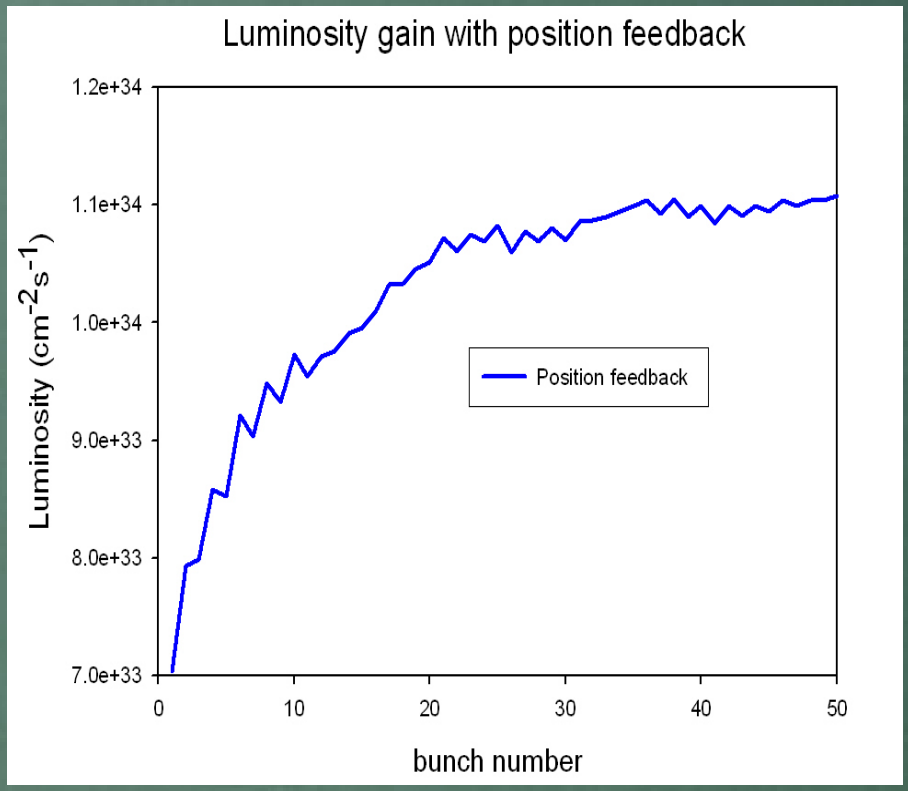
Luminosity gain – tuned, fast mode, position feedback



Converges slowly

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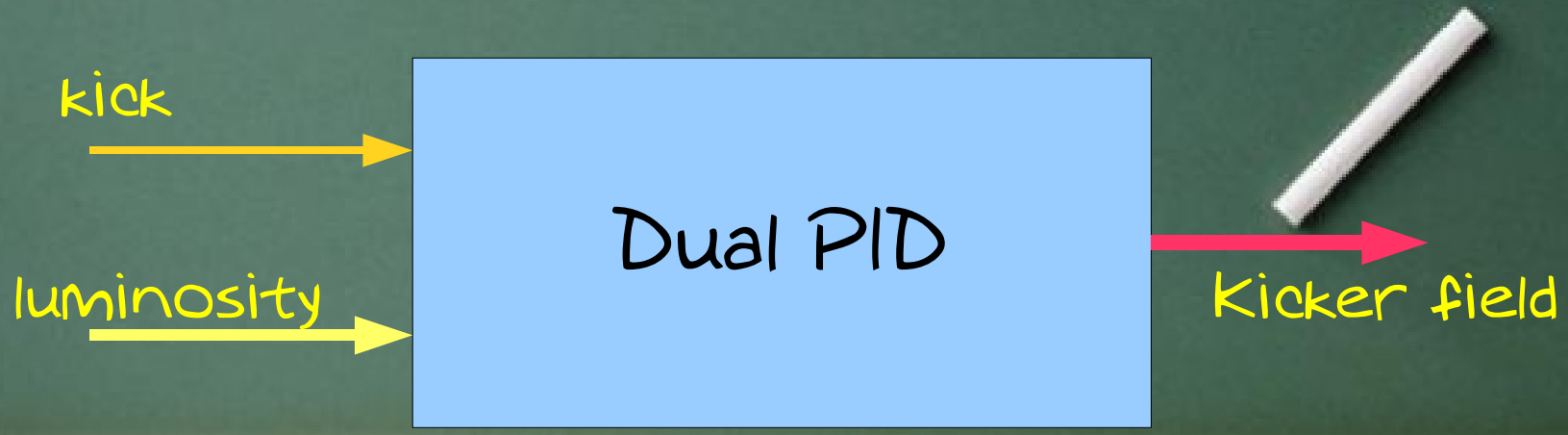
Luminosity Gain Improvement

- Agressive gain at the start of the train?
- Luminosity signal available after 500ns, i.e. From 2 bunches in the past
- Previously a single scan for luminosity is performed well down the train,

Can we use the luminosity signal in the feedback as a setpoint for the position setting?



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Tried 3 different feedback methods

1. Position feedback only, converges slowly
2. Gain set to one for first 3 bunches, then to Z-N values thereafter
3. Use the luminosity signal adaptively as a setpoint for the position feedback