Thanks to:

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Automating Linear Optics Measurements

And Update for ADT AC Dipole in Multiturn

Ujani Kar



Outline

- Part 1:
 - Updates in Multiturn ADT AC Dipole

- Part 2:
 - Automate Optics Measurements -Multiturn

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I. ADT AC Dipole in Multiturn



Purpose

- Current measurements of ADT AC Dipole using the AccPit goes to Coupling Server, and overloads it.
- Putting the tab in the Multiturn directly writes the kick data to the OMC logbook. Easier to keep track of the data generated.



Adding the ADT AC Dipole Tab in Multiturn





II. Automating Linear Optics Measurements





To Automate Linear Optics Measurements in LHC

Motivation:

Make Linear Optics Measurements easier for non-experts, reducing the workload of experts.



How Optics Measurements are done

Machine and Beam in Correct State

Excite with AC Dipole until we have sufficient amount of high amplitude kicks

Analyse Data from kicks



Plan to Automate Optics Measurements – A Flow Chart





Plan to Automate Optics Measurements





Step 1: Before Kicking/Exciting :

- Make all the manual checks semi-automatised.
- Check every time before kicking- individual steps

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Status indicators for visual checks



Step 2 : Condition Checks after each Kick



 Confirmation
 A
 X

 Previous Losses Above 30%

 Do you want to continue?

 Yes
 No

Requests for human help when out of set limits in BLMs or Intensity

Message boxes providing immediate updates on acquisition and control parameters.





Step 3 : Excite based on Amplitude



- Betabeat analysed for different kick to find an acceptable level of errorbars in beta amplitude to get a good kick.
- Higher amplitude kicks -> Signal-to-noise ratio gets better

[Only works if there are no major changes in the optics/beam set up, such as in 60 degrees]



2. Conditional Kicking Based on Peak-to-Peak Amplitude





Step 4 : Store kicks, Send for Analysis



- Every good kick has to be stored and sent for analysis automatically.
- Analysis can be done in a very similar way as in a coupling server--> reusable.
- Next step in the direction of automating the Optics Measurements.



Conclusions

- Done: The precondition checks and ongoing checks during kicks
- Undergoing: The Analysis for the excitation amplitude and programming a higher kick or exit based on this analysis.
- Future Prospect : Integrating with Optics Measurement tools for a complete automated Optics Measurement in LHC.

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0.111 Acquire QH	end flat top		end flat top			
81 V	end		end			
0.111 Acquire QV	Start Excitation tune		Start Excitation tune			
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Thank You







Action Vs Amplitude(kick)



With Amplitude --> Model invariant (except for 60degs) --> Else we have to normalise and make a model of AC Dipole

