

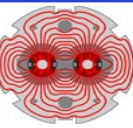
---

---

# LCU Section Meeting

Meeting - 20. April 2010

## Optics and Knobs in MadX and LSA



## Agenda

- ⇒ Introduction
- ⇒ Problems for Generation and Upload
- ⇒ Online Knobs ?!

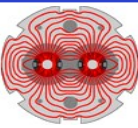
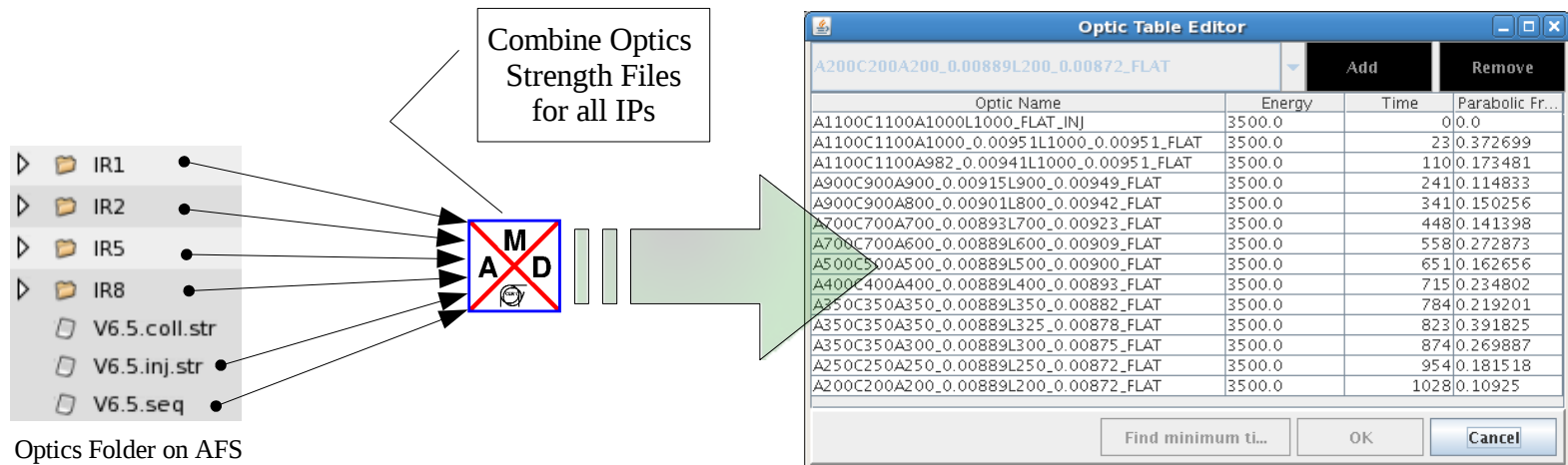
# Introduction

## ➤ Madx

- Squeeze Files per IP
- Knobs defined and matched per File
- Knob used via scalable flag
- Machine Optics created by Combination of Files

## ➤ LSA (LHC Software Architecture)

- LSA Optic (Optic Function and Strength per Circuit) define discrete Machine States
- Knobs only defined (Circuits used) **ONCE** in LSA and have different Settings per Optic
- Knobs used by Name and Trim Value
- Machine is operated by Beam Processes which are defined by a Sequence of Optics



## Problems for Generation and Upload

### ➤ Impact for Operations and Optics/Knobs Update

- Optics and Knobs that are defined in a Beam Process and have been used to run the LHC we want to leave and not Update as we want to keep the Relation between Settings (including applied Corrections during Operation) and the Settings Sources
  - Injection Optics are the same since the re-Startup
  - Knobs that are used there have to be the same in all other Beam Processes
- new Knobs can always be defined in LSA, even for the same System (Separation, Crossing, ...)
  - but they have to have a different Name if the used Circuits changed
  - good Source of Confusion during Operation if different Knobs have to be used for the same System
  - Settings Management and reuse of known good Correction gets complicated
- Knob that is to be used in a Beam Process (Machine Steering over time) has to be matched and imported to LSA for ALL Optics that the Beam Process consists of
  - if Knob is Optic independent, the Settings for each Optic have to be uploaded anyways
  - otherwise matching for each Optic in MadX is necessary

## Problems for Generation and Upload

- ⇒ IR8/3.5TeV/Special Optics have only Knobs defined that include both Changes
  - ⇒ Compensation for missing Magnet MCBYH.5R8.B1
  - ⇒ Rematching of Knob because Current Limits in MCBX Magnets
  
- ⇒ **Not possible to Generate Knobs, which only compensates for missing Magnet**
  
- ⇒ IR1/5 Squeeze Optics define Knobs using MCBX2 Correctors but Strength Value is zero and in Injection Optics these Correctors are not included in the Optic Files
  - ⇒ **Manually removed unused MCBX2 Components from Knobs**

## Online Knobs ?!

What to do in case of Un-availability of Magnets defined in a Knob during Operation?!

Either: Dump the Beam / Access for Repair (**COST and TIME!!**)

**OR:** Rematch the Knob without the missing Magnet / Circuit

- ⇒ are there Matching Jobs defined for Crossing / Separation / ... that are generalized
- ⇒ Evaluation necessary how long that would take

Thank you for your Attention!

Discussion / Questions?!