

# U2 Tracking Workshop Introduction

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# Aims of the workshop

Over the last year the number of people working on tracking for U1B and U2 has grown dramatically. Given the increasing number of people working in this area and that we need to have first draft of FTDR input by February, seemed good point for a workshop. Today hope we can

- Share information on the studies going on for the FTDR
  - Check we are covering everything
- Share ideas about how the tracking system should look

Hope workshop can be informal, allow to present ideas and in progress studies. Tim reserved for discussions

# Tracking Challenges in U2

- PV association in the VELO
- High local hit occupancies in T stations: bad combinatorics for tracking
- High track density: matching of downstream and upstream parts of the track becomes a concern
- Radiation damage: especially for the fibers and their SiPMs

How to deal with this ?

- VELO looking at 4-d detector adding timing to pixels.
- Tracker was all strips (2-d detector), we can profit from moving to 3-d detector (ie segment in y)

# What do we want to do

- Retain U1 performances at luminosity up to  $1.5 \times 10^{34}$
- **Build a detector at reasonable cost.** We cannot ignore this point
- **Do better where possible** as this is the last big LHCb upgrade
- Better might mean expanding as well as improving the physics program
  - Heavy ions, Improved Ks tracking, low momentum particles, high pt physics, ...

For the framework TDR, we won't have all the answers and can present options, but need to make the case we have baseline that works for reasonable cost. For framework TDR we will need to make simplified studies, but as we move to detector TDR we need full simulation studies and should prepare for this

# Summary

For FTDR we need to

- Show that we have a global tracking strategy that works in Run 4
  - Key points: Matching, global optimization, occupancies in SciFi, size of silicon
  - Simplified studies will be necessary, we don't have to have all the answers, options can be open
- Detector TDRs are not so far off, we will need to prepare for full simulation
  - In particular for relatively new idea of barrel detector
- Making the case for 1B is important
  - Magnet stations
  - Inner Tracker
- Demonstrate that SciFi can work in Run 5 and beyond with inner silicon part
  - Key parts: radiation damage and noise