

ITS Upgrade Studies - Working Group 1

Physics Motivations and Detector Functional Requirements

ITS Upgrade Meeting, 29th November 2010

L. Musa

- ◉ Tasks
- ◉ Structure
- ◉ Discussion

Define the physics motivations for the upgrade: scope, novelty and competitiveness

Define the detector functional requirements

- acceptance
- vertexing and tracking performance
- PID performance
- detection time and readout rate
- trigger capabilities
- timing capabilities

Prepare the “Physics Motivations and Detector Functional Requirements” chapter of the Technical Proposal

Members (16)

Bari: N. Di Bari, G. Bruno, G. Volpe

CERN: Z. Conesa del Valle (tbc), M. Mager, K. Safarik, R. Shaoyan

Lyon: J-Y Grossiord

Padua: F. Antinori, A. Dainese, R. Turrisi

St. Petersburg: G. Feofilov, V. Vechernin, Kolozhavri + Ph.D. Students

Torino: F. Prino, M. Poghosyan

Conveners: A. Dainese, tbd

We warmly invite other members of the collaboration to join the ITS Upgrade WG1 to

- work on one or more tasks
- participate to the meetings and contribute to the discussions

Primary objective

Extend ALICE physics capabilities to the identification of short-lived particles containing heavy quarks through reconstruction and identification of the displaced vertex at midrapidity

In order to identify short displaced vertices the ITS2 is required to have excellent pointing resolution of the order of 50 μm up to very low p_t values

Improving impact parameter resolution by a factor 2 or better would allow

- increase sensitivity to charm
 - study case (e.g. $D^0 \rightarrow K^- \pi^+$, or $D^0 \rightarrow K 3\pi$)
 - enhancement of reconstruction efficiency and significance
- give access (increase sensitivity) to charmed baryons
 - study case (e.g. Λ_c)
 - hadronic decay channel $p-K-\pi$
 - intermediate resonances through their respective decay channels
 - reconstruction efficiency
 - Λ_c/D^0 significance
- exclusive B decays

In addition we might look at

- extending the acceptance to larger rapidity
 - long range correlations studies at large rapidity (Feofilov at PWG2 tomorrow)
 - in the muon-spectrometer acceptance (J-Y Grossiord at upgrade forum)
 - rejections of muons from pion and kaon decay
 - identification of muons from charmed and bottom hadrons
 - direct dimuons, thermal dimuons, ... ?
 - improvement of the ψ' measurement
 - identification of quarkonia from bottom hadron decay
 - dimuon physics (quarkonia and low masses)
- improve standalone tracking and PID capabilities
- improve readout and trigger capabilities
- provide accurate timing information (e.g. in the forward region)

Meetings

- frequency
- audioconference or videoconference
- indico: ALICE ITS upgrade (<http://indico.cern.ch/categoryDisplay.py?categId=3211>)