

## Upgrade of the ALICE Inner Tracking System

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The Inner Tracking System (ITS) is the ALICE key detector for the study of heavy flavour production at LHC. This is attained by the identification of short-lived hadrons containing heavy quarks which have a mean proper decay length in the order of 100-300  $\mu\text{m}$ . To accomplish this task the ITS is composed of six cylindrical layers of silicon detectors (two pixel, two drift and two strip) with a radial coverage from 3.9 to 43 cm and a material budget of 1.1 %  $X_0$  per layer.

In order to enhance the ALICE physics capabilities and in particular the tracking performance for heavy-flavour detection the possibility of an ITS upgrade has been studied in great detail. It will make use of the spectacular progress made in the field of imaging sensors over the last ten years as well as the possibility to install a smaller radius beam-pipe. The upgraded detector will have greatly improved features in terms of: the impact parameter resolution, standalone tracking efficiency at low  $p_t$ , momentum resolution and readout capabilities.

The usage of the most recent monolithic and/or hybrid pixel detector technologies allow the improvement of the detector material budget and the intrinsic spatial resolution both by a factor of three with respect to the present ITS. The installation of a smaller beam-pipe will allow reducing the distance between the first detector layer and the interaction vertex. Under these assumptions, simulations show that an overall improvement of the impact parameter resolution by a factor of three is possible.

After finalizing the Conceptual Design Report [1], which covers the design and performance requirements, the upgrade options as well as the necessary R&D efforts, the project has now entered the approval phase. An intensive R&D program has been launched with the objective to review the different technological options under consideration. The new detector should be ready to be installed during the long LHC shutdown period scheduled in 2017-2018.

This contribution will present the studies on the upgrade of the ALICE ITS detector. In particular, the different options for the detector technologies and the detector layout, as well as the first results of the R&D activities, will be presented.

[1] Conceptual Design Report for the Upgrade of the ALICE ITS, CERN-LHCC-2012-05, April 2012

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