

# Il sistema di tracciamento di ATLAS per HL-LHC

*Tuesday 9 April 2019 12:00 (15 minutes)*

The current Inner Detector of the ATLAS experiment will be replaced with a new, all-silicon detector to cope with the tough environment of the High Luminosity LHC (HL-LHC). The instantaneous luminosity of HL-LHC (a factor 5 to 7.5 higher than LHC) would result in harder conditions for the detector: increase in occupancy, bandwidth and radiation damage. The Inner Tracker (ITk) will consist of an inner pixel and outer strip detector aiming to provide tracking coverage up to  $|\eta|=4$ . The layout of the pixel detector is now finalized with five layers of pixel silicon sensor modules in the central region and several ring-shaped layers in the forward region: tracking and vertexing performance are expected to be similar or better to the current tracking system in a much harsher environment. Due to their radiation hardness, 3D sensors are a promising option for the innermost pixel layer while in the other layers planar sensors will be used. The required very high hit-rate capabilities, increased pixel granularity, extreme radiation hardness, and reduced material budget call for a device downscale as compared to existing sensors, involving smaller pitch (e.g.,  $50 \times 50$  or  $25 \times 100 \mu\text{m}^2$ ), reduced active thickness ( $\sim 100\text{-}150 \mu\text{m}$ ), lower power consumption. All hybrid detector modules will be read out by a new front-end chip, developed within the RD53 Collaboration, implemented in 65nm CMOS technology, connected to the silicon sensors using bump bonding (bump bond density:  $4 \cdot 10^4$  pixels per  $\text{cm}^2$ ). The talk will give an overview of the layout and current status of the development of the ITk Pixel Detector.

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**Session Classification:** Nuove Tecnologie

**Track Classification:** Nuove Tecnologie