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ATLAS toward the High Luminosity era: challenges on electronic systems

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To maximally exploit the physics potentials reachable with proton-proton collisions, the Large Hadron Collider is undergoing an ambitious upgrade program that will increase the delivered instantaneous luminosity to $7.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ allowing to collect more than 3 ab^{-1} of data at $\sqrt{s} = 14 \text{ TeV}$. One of the most challenging experimental conditions is posed by the largely increased pile-up that will grow by more than a factor 5 with respect to present conditions. In order to face this unprecedented problem, the ATLAS detector will be equipped with new sets of both front-end and back-end electronics and a new trigger and data acquisition system able to cope with higher rates. The large number of detector channels, huge volumes of input and output data, short time available to process and transmit data, harsh radiation environment and the need of low power consumption all impose great challenges on the design and operation of electronic systems. This talk will offer an overview of the solutions adopted by the ATLAS collaboration for the electronic systems in order to highlight the global strategy and picture. On the contrary, full details on the single projects will be addressed in specific talks. A summary of the status of advancements of these projects and the most important results from prototypes and tests will also be reported.

Collaboration

ATLAS

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