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SLHC Upgrade Plans for the ATLAS Pixel Detector.

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The ATLAS Pixel Detector is an 80 M channels silicon tracking system designed to detect charged tracks and secondary vertices with very high precision. An upgrade is presently being considered for the ATLAS Pixel Detector, enabling to cope with higher luminosity at Super-LHC (SLHC).
Options considered for a new detector are discussed, as well as some important R\&D activities, such as investigations towards novel detector geometries and novel processes.

Summary

The Large Hadron Collider (LHC) will be upgraded to the Super-LHC in
$\approx$ 2016 to provide a ten-fold increased luminosity and data rate.
The inner silicon tracking detectors of the ATLAS experiment will be replaced
by even more powerful devices. The new detector will face unprecedented
particle densities and radiation levels.
The increased luminosity leads to increased radiation doses, particle fluences and occupancies (fraction of channels per collision hit by a particle). The radiation dose is proportional to luminosity, while occupancy depends on the collision rate as well. The extreme radiation levels at the SLHC lead to a number of specific design challenges
for read-out integrated circuits, silicon sensors and optical signal transmission, which we believe will be met.
The impact of radiation on the overall design is important and affects
not only sensors and electronics design, but also the cooling system,
which has to provide reduced sensor temperatures to minimize sensor leakage currents.

The increased occupancy has also a huge impact and effectively shapes
the new tracker. The larger number and density of electronics channels
lead to increased power consumption, more and/or larger hybrids,
more cables and increasing detector mass.
Power consumption, power distribution and detector mass are the critical areas
that demand innovative solutions to make tracking at SLHC possible.

The overall layout of the future ATLAS tracker is not jet defined,
but experience from LHC tracker construction suggests that the layout will
most be determined by services (electrical and cooling).
Understanding and minimizing the service volume will be crucial.

Options considered for a new detector are discussed, as well as some important
R\&D activities, such as investigations towards novel detector geometries and novel processes.

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