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From LHC to HL-LHC ... challenges and routes to solutions

The pixel detectors currently in operation established the hybrid pixel technology that is now mainstream. From this new vantage point, several concepts that were previously too controversial are now being explored for the HL-LHC generation of detectors. At the same time, some problems that were considered solved have shown surprises, while in other cases the correct path appears to be the opposite of the previously assumed solution. This talk will review the challenges of HL-LHC and the development carried out to address them, highlighting the above aspects. The challenges around the HL-LHC ring include high rate and radiation for both sensors and electronics, large area and low cost, high track density and pileup, higher resolution and lower mass, higher readout rate. In most cases specific developments to address these challenges will be further covered in other talks in this conference (3D, planar, and high speed sensors, MAPS, mechanics and cooling, RD53 and radiation tolerance, high speed readout, etc.) so the intent here is to present an overview and introduction.

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