

LHCb silicon detectors according to Gauguin

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D'où venons nous? Que sommes nous? Où allons nous? Where Do We Come From? What Are We? Where Are We Going? This is a good metaphorical summary of the initial design, upgrade I and upgrade II silicon detectors for LHCb – the precision experiment at LHC. The first LHCb era, after LHC Run 1 and Run 2, finished in 2018, and the second one began immediately with an ambitious upgrade I project that will be finished this year with the commissioning of the Upstream Tracker silicon microstrip detector. Due to a significant increase in instantaneous luminosity, the LHCb experiment almost completely rebuilt its DAQ, trigger and detector systems. The most challenging tasks pertaining to the sophisticated trackers that are required to provide excellent resolutions for momentum, impact parameter and lifetime of elusive beauty and charm hadrons and potential new particles. LHCb is one of the leaders in applying the recent developments in silicon technologies as well as stimulating new research directions. The main goal is always the same – push the boundaries of precision, robustness and radiation tolerance. But pure geometrical 3D tracking is no longer a viable option for what is ahead of us. Thus, the next-generation silicon trackers must also add the temporal coordinate into the picture to cope with the challenges of HL-LHC and beyond. This is a tale of the bold chase for new ingenious detection systems that push the envelope by providing new possibilities for super precise tests of the Standard Model and possibly discovering the nature of the mysterious New Physics.

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