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Multi-Gigabit Wireless Data Transfer for Tracker Readout Systems

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State-of-the-art tracking detector systems as the ATLAS silicon micro-strip tracker will after the upgrade in 2022, require an overall readout bandwidth between 50 and 100 Tb/s.

To allow such a highly granular tracker to contribute to the first level trigger decision or event filtering, a fast readout system with a tremendous bandwidth is therefore essential. With up to 9 GHz of continuous license free bandwidth allocated worldwide centered around 60 GHz, a fast readout system using a wireless data transfer at that carrier frequency becomes feasible.

A prototype transceiver at 60 GHz with 9 GHz bandwidth is currently under development at University of Heidelberg using the IBM 0.13 μ m SiGe HBT BiCMOS process. The design is based on the well known super-heterodyne transceiver architecture. The targeted data rate for our first prototype is 4.5 gigabit per second over a distance of 20 cm. The Multi-Gigabit transceiver system, its individual blocks and key issues of the system design will be explained in detail in this talk.

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