

Optical Data Communication in Particle Detectors

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Institutions running large particle accelerators like CERN or GSI have an increased demand of data transmission capacity each update^{1,2}. Transmission capacity with copper cables is limited in speed to several Gbps (Gigabit per second). Optical technology is poised to solve this bottleneck. The leading candidate is silicon photonics and the workhorse of such an interconnect is the optical modulator³. Modulators have big advantages, on electrical side they are CMOS compatible, have a bandwidth to the multigigahertz regime and low energy consumption. On the optical side they allow transmission in cheap silica and a wavelength division multiplexing (WDM) for many transmission channels on a single glass fiber. However the demands on optical interconnects in a detector environment are significant and many questions are still unanswered as to whether silicon can meet the required performance metrics. Processing of PICs (photonic integrated circuits) with standard CMOS is non-trivial; also the influence of radiation, extreme cold and magnetic field is unknown. This poster shows the current work on optical modulators for detector applications and gives an outlook to the future work.

References

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