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Application Specific Photonic Integrated Circuits for High Energy Physics Applications

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Physics experiments generally deal with enormous data throughput. The density of the data is increasing with upgrades on the detectors and experiments. Fiber optic communication with its high bandwidth and high capacity provides an effective solution. In experiments like the KM3NeT, cost-effective long haul optical communication is desired. A Dense Wavelength Division Multiplexed (DWDM) based multi-channel readout with minimum number of fibres over a large distance is a significant challenge. However, in the detectors at the Large Hadron Collider (LHC) or similar facilities, distances are short, but the optical readout systems are exposed to radiation. So, radiation hardness of optical links and/or circuits is an important requirement. Photonic integrated circuit design is going through an exciting phase with generic integration philosophy. Thanks to the availability of MPWs, it is getting easier to design and test an Application Specific Photonic Integrated Circuit (ASPIC). With such broad range of physics applications, we demonstrate examples of ASPICs designed for high energy physics using generic integration platforms.

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