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Design of Si-photonic structures to evaluate their radiation hardness dependence on design parameters [1]

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Particle detectors for future experiments at the HL-LHC will require new optical data transmitters that can provide high data rates and be resistant against high levels of radiation. Furthermore, new design paths for future optical readout systems for HL-LHC could be opened if there was a possibility to integrate the optical components with their driving electronics and possibly also the silicon particle sensors themselves. All these functionalities could potentially be combined in the silicon photonics technology which currently receives a lot of attention for conventional optical link systems. Silicon photonic test chips were designed in order to assess the suitability of this technology for deployment in high-energy physics experiments. The chips contain custom-designed Mach-Zehnder modulators, pre-designed ``building-block'' modulators, photodiodes and various other passive test structures. The simulation and design flow of the custom designed Mach-Zehnder modulators and some first measurement results of the chips are presented.
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