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RADIATION-HARD ASICS FOR OPTICAL DATA TRANSMISSION

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The LHC at CERN is currently the highest energy and luminosity hadron collider. To take advantage of the physics offered by this new frontier, the ATLAS experiment plans to add a new pixel layer to the current pixel detector during the 2013 shutdown. The optical data transmission system will also be upgraded to handle the higher data transmission speed. Two ASICs have been prototyped for this new generation of optical links to incorporate the experience gained from the current system. The ASICs were designed using a 130 nm CMOS process. One ASIC contains a 4-channel VCSEL driver array and the other a 4-channel PIN receiver/decoder array with one channel of each array designated as a spare to bypass a malfunctioning VCSEL or PIN channel. We characterized the ASICs and then irradiated them to measure their radiation hardness and single event upset (SEU) tolerance. We will present results from this study. In addition, a new version of the ASIC has been submitted for fabrication. The new ASICs have been expanded to 12 channels with improvements based on the prototype results. We will briefly discuss this new design.

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