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Verification of readout electronics in the ATLAS ITk Strips detector

Particle physics detectors increasingly make use of custom FPGA firmware and application-specific integrated circuits (ASICs) for data readout and triggering. As these designs become more complex, it is important to ensure that they are simulated under realistic operating conditions before beginning production. This talk will cover the use of cocotb, an open source digital logic verification framework, to verify several custom ASICs designed for the ATLAS ITk Strip detector. Using cocotb, verification can be done at high level using the Python programming language, allowing sophisticated data flow simulations to be conducted and issues to be identified early in the design phase. I will discuss the front-end readout architecture for the ITk Strip detector, how we simulated it, and the sorts of problems we found and eliminated thanks to the use of the cocotb framework.

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