Abstract Submitted
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Chronopixels: particle detector R&D for the ATLAS phase 2 upgrade[1] CHRISTIAN WEBER, KEITH BAKER, THOMAS BARKER, CHARLES BALTAY, Yale University, NIKOLAI SINEV, SLAC, JIM BRAU, DAVID STROM, University of Oregon, ATLAS COLLABORATION — The pixel detector comprises the innermost part of the ATLAS detector. Its proximity to the interaction point together with its micrometer resolution allow for impact parameter determination and vertex fitting. This proximity however exposes it also to the highest radiation fluences and particle densities. The latter poses a challenge in inferring particle tracks from hit pixels, while the former leads to progressive radiation damage of the pixel detector itself. These problems will worsen after the LHC's third long shutdown in 2025 when it will operate in high luminosity mode at about five times the current instantaneous luminosity. These conditions will require the pixel detector to be replaced by one staffed with pixel modules capable of enduring the harsher radiation environment, and with finer granularity to cope with the increased pileup. Several efforts in the community are on their way to produce such a pixel module. We are presenting here the current status of our R&D on such a pixel module: The Chronopixel for ATLAS phase 2, a fully monolithic active pixel sensor in CMOS technology. Sensing and readout electronics are included in each pixel here. As such it does not require expensive and labor intensive bump-bonding to a separate readout chip, reducing cost and material in the pixel detector.

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