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The upgrade of the CMS forward pixel detector for the HL-LHC
ABRAHAM MATHEW KOSHY, JOSHUA LEEMAN, ANDREAS JUNG, Purdue Univ — The Large Hadron Collider (LHC) at CERN is a unique place in the world for research in particle physics, most recently made famous by confirming the existence of the Higgs Boson in 2012. The high-luminosity upgrade of the LHC (HL-LHC), scheduled for 2023, will generate a higher instantaneous luminosity than ever before. The HL-LHC poses an extreme environment to the innermost CMS detector region and, hence CMS currently designs a lightweight silicon pixel detector that can withstand the higher particle flux. Measurements of thermal conductivities of various materials are carried out and are used as an input to thermal simulations of heat dissipation of possible low-mass detector designs. The results of these simulations are compared with data of mock-up detector prototypes accumulated employing a CO₂ cold box setup emulating the CMS detector cooling scheme.

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