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The CMS Phase 1 Upgrade Forward Pixel Detector Mechanical Support and Cooling

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In 2017 the luminosity of the LHC will also be upgraded to 2E34 cm-2s-1, providing physicists a greater opportunity to seek answers to some of the particle physics mysteries we have encountered since the inception of the LHC. A new pixel detector for the CMS experiment is currently under construction, to be installed during the extended year end shutdown 2016/2017. The pixel detector, the core of the CMS detector, was commissioned in 2008 and is so far running successfully. However the higher instantaneous luminosity will cause unacceptable dynamic inefficiencies due to buffer overflows. The more complex track pattern recognition due to higher pileup will require an additional pixel detector layer to maintain good efficiency. The Phase 1 pixel detector replacement will address these shortcomings. To add an additional detector layer without adding material required a complete redesign of the mechanical support and cooling using novel materials. This contribution will cover the important aspects of the CMS Phase 1 Upgrade Forward Pixel detector mechanics and cooling that enabled a significant reduction of the overall mass while adding an extra detection layer. Challenges that had to be overcome during the design, prototype, and construction will be included.

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