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## Status and perspective of the Barrel Timing Layer project for the Phase II upgrade of the CMS detector

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An upgrade of the CMS detector is essential to maintain its current performance in event reconstruction during the High Luminosity phase of LHC (HL-LHC or Phase II), which will be characterized by about 200 interactions per bunch crossing (pileup). The upgrade project includes the new MIP Timing Detector (MTD) to deal with the increased pileup level. The MTD will achieve a time resolution of about 30-40 (60-70) ps at the beginning (end) of its operation. The Barrel part of the MTD (BTL) will be instrumented with modules made of 16 bars of LYSO:Ce scintillating crystals coupled at each end to Silicon Photomultipliers (SiPMs). The BTL will be the first of its kind to operate the SiPMs at high radiation levels, up to an integrated particle fluences of  $\sim 2 \times 10^{-14}$  "1 MeV neutron equivalent fluence" ( $n_{eq}/\text{cm}^2$ ) and radiation doses up to 30 kGy. Radiation tolerance qualification of the sensor technology has been carried out to assess that BTL can operate in the harsh HL-LHC conditions. The prototype testing campaign is reaching its end, while the construction phase is planned to begin at the end of 2023. In this talk, results concerning the characterization of the module prototypes obtained with radioactive sources in the laboratory, or during the recent test beam campaigns will be shown, and an overview of the current status of the BTL project will be provided.

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