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Development and prototype of a new luminometer for the ATLAS experiment during Run 3 and Run 4 of the LHC

Thursday, 7 September 2023 12:00 (20 minutes)

The Beam Monitor for ATLAS detector (BMA) is an additional luminosity monitor for the ATLAS experiment, targeting the luminosity determination in Run 4 of the Large Hadron Collider (LHC). The detector is composed of small square pads with about 1mm per side of Low Gain Avalanche Detector (LGAD) silicon sensors, intended to be placed in the ATLAS detector forward shielding at about 16m from the interaction point.
The detector is innovative in several aspects: It does not need an external cooling system, and its readout preamplifiers are meant to be placed at about 25m distance from the sensors, in an area in which the radiation levels for the electronics can be neglected. Moreover, the tiny acceptance of the small pads is supposed to minimize systematic effects in the luminosity determination due to pile-up of several interactions in a single or consecutive proton-bunch crossings.
A two-channels prototype of the detector has been installed already for Run 3 of the LHC and recorded data in the year 2022. A modified version is set up for data-taking in the current year 2023.
The talk will present the technical details of the project regarding the sensors, their cooling, and the readout system. A short summary of the performances obtained during the detector operation periods so far will be given in addition.

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