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## The upgrade of the ATLAS Luminosity detector (LUCID) for HL-HLC

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Throughout ATLAS Run-2, the LUCID detector, that is located close to the beampipe on both side of the interaction point, has been the reference luminosity detector, providing the online and offline luminosity measurement with high stability and a preliminary uncertainty of about 1.7%.

For the high-luminosity LHC, new beampipe equipment and more demanding luminosity precision requirements and LHC beam conditions are expected. The detector will therefore be completely redesigned, exploiting both new and tried-and-tested technologies. Prototype detectors for the new running conditions and technologies have been developed and installed and will be tested during the upcoming LHC Run-3. These consist of a PMT-based detector, which uses the quartz window as Cherenkov medium and is positioned further from the beampipe, a low-rate PMT detector, located in the shadow of one of the ATLAS shieldings, and the fiber detector, in which fiber bundles are used as Cherenkov-light emitter and transmitter and that are calibrated with an innovative hybrid LED and radioactive-source system. In these prototypes, the behavior of new Hamamatsu R1635 and R7459 PMT's will be evaluated.

In this contribution, the motivations for the detector redesign and a description of the LUCID upgrade are illustrated, as well as a detailed account of the preliminary tests performed with the prototypes, including PMT characterization and a study of the fiber degradation under irradiation.

### Collaboration

ATLAS

**Presenter:** LASAGNI MANGHI, Federico (Istituto Nazionale di Fisica Nucleare)

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