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Upgrade of the ALICE Time Projection Chamber

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The Time Projection Chamber (TPC) of the ALICE experiment is being upgraded with new readout chambers based on Gas Electron Multiplier (GEM) technology during the second long shutdown of the CERN Large Hadron Collider. The upgraded detector will operate continuously and trigger-less without the use of a gating grid. It will thus be able to read out all minimum bias Pb-Pb events that the LHC will deliver at the anticipated peak interaction rate of 50 kHz for the high-luminosity heavy-ion era. After several years of R&D, the last two years were devoted to the production of 80 quadruple-GEM chambers in several institutes and countries utilizing 640 GEM foils. The chambers underwent a detailed quality control procedure in order to ensure the highest standard as required for the installation in the ALICE TPC.To guarantee optimal operational safety, a careful design of the HV configuration, employing so-called cascaded power supplies, was developed. Continuous readout of the TPC data with rates up to 3 TByte/s into the online data farm will be accomplished by a new front-end scheme, utilizing the newly developed SAMPA readout ASIC, and the GBT readout system developed at CERN. The presentation will give an overview on the overall production process, with special focus on the results of the completed assembly of the new GEM-based read-out chambers and the production of the new readout electronics. Furthermore, an outlook on the forthcoming installation activities will be presented.

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