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Overview of the CO2 cooling DEMO obtained results and a prediction of future system behavior.

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ATLAS and CMS are using CO2 cooling for their phase-2 upgrade inner detectors. The challenges for the new cooling with respect to past CO2 systems are the on-detector colder temperatures required (<-40'C) and the large increase of the heat load with 2 orders of magnitude. The final predicted heat loads for ATLAS is 300 kW and for CMS 550kW.The cooling will be segmented in sub-units with a maximum per-plant design capacity of 100kW.

A DEMO cooling system was built to demonstrate the feasibility of the larger plant design. Several new features were introduced compared to previous systems, which needed a feasibility demonstration: Accumulator flow-through to save electrical heating power, a common surface storage to minimize the CO2 volume used underground, and an R744 primary system to allow a surface-located chiller.

DEMO also acted as a test system for component qualification. The large scaling up required the introduction of new technologies to be tested under our special conditions. Special pumps, heat exchangers and valves have been developed together with manufacturers. DEMO also functioned as an overall system demonstrator. The full set-up had real-scale transfer lines and large dummy load power units to simulate the detector heat load.

DEMO has evolved over time to become similar to the final design. The plants and accumulators are now in production based on the lessons learned in DEMO. This talk will summarize the lessons learned in DEMO and will summarize the predicted behavior of the final systems.

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