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CEA test facilities applied to superconducting magnets, cryomodules and physic detectors

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Oral presentation (20 min) + Q&A (10 min)

The STAARQ cryogenic test station is designed to test and characterize magnetically 2 series of quadrupole magnets for the LHC accelerator: 6 MQ magnets running at 13kA for the LHC consolidation project and 2 MQYY magnets running at 6kA for the HiLumi project. The pressurized superfluid bath required to run those magnets in the station at 1.9K and 1.4 bars can accommodate magnets up to 640 mm in diameter, 5.5m in length and 12t in mass. Among its notable characteristics, the station is equipped with a hermetic cold pumping system (up to 3.5g/s) to run the 1.9K heat exchangers. It enables the recycling of the helium exhaust in the LP circuit of the liquefier without additional purification. The full magnetic characterization of the magnets is achieved through a magnetic probe system running inside 2 anticryostats (50mm diameter and 7.35m length) inside the apertures of the magnets. Finally, the cryostat of the station is equipped with prototype hybrid superconducting current leads running liquid nitrogen to cool the resistive/superconductive junction in order to mitigate the heat leaks the liquefier has to deal with.

In this presentation, we will present the results of the initial successful commissioning of the station. We successfully tested the prototype hybrid current leads at their maximum rated current. We also fully characterized the cryogenic process and 1.9K cooling system through an additional heating element enabling the demonstration that the station can provide more than double the 1.9K cooling power than required by the future tests of the MQ and MQYY magnets.

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