

Test protocol for the 4.5K cryogenic leak test of beam vacuum chamber in SIS100 quadrupole doublet modules

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The SIS100 synchrotron is presently under construction, and it will be part of the FAIR particle accelerator facility at GSI-Darmstadt. The bending, focusing as well as correction of the ion beam is demanded to superconducting magnets (dipoles, quadrupoles and correctors) integrated in modules, together with temperature sensors, vacuum gauges and beam diagnostic systems. To ensure the quality standard, after the warm factory acceptance test, further cryogenic tests on the modules have to be carried out before installation in the SIS100 tunnel. A new test facility for site acceptance test on quadrupole doublets modules (QDM) has been set up in Salerno. The test facility has been designed to fulfill the requirements of the test protocol, agreed with GSI. The protocol foresees a full characterization of the QDM going through electrical tests, sensor and beam diagnostic integrity and functionality, heat load measurements, as well as vacuum quality. All of these tests have to be carried out at different conditions: room temperature/pressure, under vacuum from room temperature to 4.5K and at room temperature/pressure again. In this scenario, the most challenging test is the cryogenic leak test on the beam vacuum chamber. This chamber is designed to work in the range of 10^{-12} mbar at 4.5K and a dedicated test protocol has been drawn up foreseeing a full vacuum quality monitoring and a leak test at 4.5K. The design and commissioning of the test facility in Salerno will be presented with preliminary results obtained during the first cooldown of the prototype superconducting modules.