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## **Thu-Af-Or22-05: FAIR's first SIS100 Accelerator Quadrupole Doublet Module –Manufacturing Update and Test**

*Thursday, 26 September 2019 17:30 (15 minutes)*

The new and unique accelerator complex FAIR is currently under construction at GSI, Darmstadt, Germany. FAIR, the Facility for Antiproton and Ion Research, will investigate matter behavior inside stars, antimatter as well as biophysics questions using its variety of physics experiments. The core of this facility is the 1100 m circumference heavy ion synchrotron SIS100 featuring 100 T/m magnetic beam rigidity, which utilizes fast-ramped iron dominated superconducting dipole -, quadrupole - and corrector magnets cooled with 2-phase helium flow.

Two units consisting of each a quadrupole and a corrector magnet are integrated together with beam diagnostic elements into a common cryostat forming the so-called Quadrupole Doublet Modules.

The series production of the dipole magnets at Bilfinger Noell has reached half production stage with testing at GSI's magnet test facility. In comparison, the complex Quadrupole Doublet Modules are produced and tested in several stages. At JINR Dubna, the units are manufactured and tested at 4 K. Afterward's the units are shipped to Bilfinger Noell for the integrating those into modules which are, subsequently, tested at INFN Salerno for final acceptance before installation in the tunnel.

The first prototype Quadrupole Doublet Module is prepared in spring 2019 and an extensive testing campaign is planned at GSI in summer 2019. With the test, the complicated engineering of the Doublet Module itself is evaluated, before releasing the series production of 83 Quadrupole Doublet Modules. The 1st Quadrupole Doublet is instrumented with 200 sensors measuring temperatures, voltages, strain, and beam instrumentation. The vacuum and cryogenic behavior as well as ramp losses in static and dynamic operation following various SIS100 operation modes will be examined. The precision of the aligned magnetic axes of the two magnet units in the module will be investigated.

The complexity of the Quadrupole Doublet magnets integration, the intensive acceptance processes and first results of the cold testing campaign at GSI are presented.

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