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## **Tue-Mo-Po2.03-10 [15]: Design and Manufacturing Assessment of a Multi-purpose Detector for NICA Collider**

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Nuclotron-based Ion Collider state-of-art design involves innovative solutions in superconductive applied technology. Thanks to its consolidated experience, ASG has been directly involved into the program by providing to Joint Institute for Nuclear Research (JINR) a large 0.5 T Nb-Ti superconductive magnet (5.8m diameter, 8.1m length) equipped with active (resistive) modulation system. Typical solutions have been specifically optimized in order to guarantee maximum flexibility in all operative conditions.

ASG has been involved in the whole design: magnetic, structural, thermal, protection and control systems, including all auxiliary systems needed for the full magnet operation modes.

Magnetic configurations meeting optimized field requirements have been also selected accounting in detail the technological deviations. Two resistive coils perform the active modulation system that principally tune the optimized magnetic configurations.

The design takes in consideration Lorentz forces and coil interactions produced by the system to optimize mechanical structure and stresses on the coils. The electromagnetic interactions between components, during dynamic events, have been evaluated in order to verify the cryogenic and structural stability of the system.

The hydraulic/cryogenic system has been designed and manufactured in order to keep the magnet in superconductive condition: a thermal shield has been designed to reduce the radiation load while a liquid helium circuit has been optimized to keep the cold mass below 4.8 K.

A complete control system has been produced and configurated to operate the magnet and all the related auxiliary systems (vacuum, cooling, protection, power supply...) and also to protect the magnet in case of quench, in order to minimize thermal stresses on cold mass components.

For the manufacturing, ASG developed innovative system to operate with large magnet that allows winding of superconductive cable on thin former with  $\approx 5$ m of diameter. Another tool was designed and manufactured on purpose to complete the assembly with horizontal axis.

Manufacturing phase is finished: winding is completed and assembly is ongoing,

Main results will be presented to illustrate the adopted process and technological solutions.

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