27th International Conference on Magnet Technology (MT27)
Fukuoka, Japan / 2021

Contribution ID: **390** Contribution code: **WED-OR3-702-06** Type: **Oral**

3D magnetic field maps and alignment of the Superconducting Multipole Triplet (SMT)

Wednesday 17 November 2021 17:15 (15 minutes)

The Super Separator Spectrometer (S3) aims to study the limits of the nuclear existence [1][2].
In order to achieve large momentum as well as charge-state acceptance for S3 layout, a high-gradient field magnet technology that generates a pure normal multipole field has been designed. This magnet is designed according to the current sheet approach. For a better overall quality field produced by the magnet, it is also crucial to optimize the shape of the coil ends. Therefore, we have used the technique proposed by Walstrom [3][4] for designing the Superconducting Multipole Triplet (SMT). To our knowledge, this technique has never been used yet in a nuclear physics spectrometer application. Cryomagnetics Inc. and Advanced Magnet Lab Inc. have built seven SMTs that were recently delivered to GANIL. Each SMT assembles three singlets of 11 NbTi coils made up of 3 quadrupole, 3 sextupole, 3 octupole and 2 dipole coils.
To determine the efficiency of the Walstrom'coil method for the magnets, we have developed two new field mapping setups. These latter use the same high spatial resolution three-axis SENIS Hall probe [5]. One setup was developed in Argonne National Laboratory, it relies on mapping along the azimuthal and axial direction of the cylinder, at a fixed radius. Then, using a numerical method described in [6], we can extract a full 3D field map. The second precise measuring field system was designed and built at GANIL to help ensuring the alignment of the cold mass in the SMTs. An extensive series of measurements is planned in GANIL laboratory at helium temperature, in June 2021.
Detailed information of the two experimental setups will be presented along with magnetic field analysis on the SMTs multipoles for multiple current values, coil combinations and different cooling cycles, thus providing sufficient data for the commissioning process.

Primary authors: Dr ESPER, Alexandre (GANIL); Mr STODEL, Marc-Hervé (GANIL); Dr SAVAJOLS, Hervé (GANIL); Dr AUTHIER, Martial (IRFU, CEA-Saclay); Mr CARVILLE, Frederic (GANIL); Dr DROUART, Antoine (Irfu, CEA-Saclay,); Dr GAMPA, Ravi (Argonne National Laboratory); Mr LEFEVRE, Alexis (GANIL); Mr LEFROU, Thierry (GANIL); Mr LUTTON, Franck (GANIL); Prof. NOLEN, Jerry (Argonne National Laboratory); Dr SONG, Jeongseog (Argonne National Laboratory)

Presenter: Dr ESPER, Alexandre (GANIL)

Session Classification: WED-OR3-702 Magnetization and Loss