Contribution ID: **3** Type: **not specified**

A versatile bulk superconducting MgB_2 cylinder for the production of holding magnetic field for polarized targets and nuclear fusion fuels

Tuesday 27 September 2022 15:00 (25 minutes)

A versatile solution is being pursued for the challenging magnetic problem of producing internal fields in compact spaces. It is a promising tool for trapping fields around a polarized target, while shielding out external fields from spectrometers, and in addiction, for generating holding fields for accumulation and transport of polarized fuel in nuclear fusion tests.
The bulk superconductor is cooled by a cold-head driven by a helium compressor, therefore the project is in a framework of eco-sustainability.

A bulk MgB_2 superconducting cylinder has been already characterized by measurements of the interior field retention and exterior field exclusion, together with the corresponding long-term stability performance, so far done just in the center of it at 1 tesla transverse magnetic field and at temperature at about 13 K.

The research program is now focused on mapping the trapped field along the symmetry axis, at higher magnetic field and at lower working temperature. After new measurements in a transverse magnetic field, the cylinder might be tested in a longitudinal field, and finally prepared in a transverse field and then immersed in a longitudinal field to test its capability of shielding the latter, while preserving the former.

In the context of an electron scattering experiment, such a solution minimizes beam deflection and the energy loss of reaction products, while also eliminating the heat load to the target cryostat from current leads that would be used with conventional electromagnets.

In the context of polarized fuel for fusion its use is straightforward, because the system can trap the magnetic field required during fuel production, and then provide the holding field for its transfer in fusion test facilities.

Category

New Applications

Primary authors: CIULLO, Giuseppe (Dipartimento di Fisica e SdT Università di Ferrara and INFN sez. di Ferrara - Ferrara); Dr BARION, Luca (INFN-Sezione di Ferrara); Prof. DEL BIANCO, Lucia (Dipartimento di Fisica e SdT - Università di Ferrara and INFN sezione di Ferrara); Prof. LENISA, Paolo (Dipartimento di Fisica e SdT - Università di Ferrara and INFN sezione di Ferrara); Dr SPIZZO, Federico (Dipartimento di Fisica e SdT - Università di Ferrara and INFN sezione di Ferrara); Dr STATERA, Marco (INFN - sezione di Milano); Dr TAGLIENTE, Giuseppe (INFN - sezione di Bari); Dr CONTALBRIGO, Marco (INFN-Sezione di Ferrara)

Presenter: CIULLO, Giuseppe (Dipartimento di Fisica e SdT Università di Ferrara and INFN sez. di Ferrara - Ferrara)

Session Classification: New Applications