Contribution ID: **247** Type: **not specified**

MgB2 and Iron based materials: the FCC activity at SPIN

Tuesday 10 April 2018 14:08 (18 minutes)

The proposed Future Circular Collider at CERN should reach a collision energy of 100 TeV thanks to a four times larger radius and double the magnetic field of the LHC. The latter requirement necessitates the development of superconducting materials/conductors with increased operating field.
Whilst most efforts are focused on Nb3Sn wires, this is an opportunity to assess the potential for high field application of newer superconductors. In the context of a collaboration between CNR-SPIN and CERN, we plan to investigate three different superconducting materials, i.e. Bi-2212, MgB2 and iron-based superconductors (IBS), with the scope of advancing their performance using industrially scalable production methods.
MgB2 conductors can be realised by the powder in tube (PIT) method and have the advantages of low cost and a relatively high critical temperature, Tc. However, the upper critical field, Hc2, and pinning in these conductors is still not optimised. Through the development of a boron precursor synthesis route, we plan to produce MgB2 nanopowders with the inclusion of controlled defects.
Bi-2212 wires realised by the PIT method have shown good performance at high fields. However, these results required heat treatment under pressure that is incompatible with the production of large coils for magnets. We plan to approach the performance today obtained by high pressure heat treatment through mechanical deformation and heat treatment sequences, including optimisation of the temperature profile and oxygenation conditions.
Recently discovered IBS exhibit high Tc and huge Hc2. PIT and coated conductor tapes have been successfully realised, with critical current values exceeding the threshold for practical application (105 A/cm2 at 10 T). We plan to develop prototype IBS conductors that achieve this critical current density at 16 T through reliable, simpler and scalable techniques that would permit industrialisation.
In this talk, the main goals and methods that we are developing will be reviewed.

Primary author: PUTTI, Marina (University of Genova)

Co-authors: BRACCINI, V. (CNR-SPIN, Genova, Italy); FERDEGHINI, Carlo (CNR); LEONCINO, L. (CNR-SPIN, Genova, Italy); LEVERATTO, Alessandro (CNR-SPIN); MALAGOLI, Andrea (CNR-SPIN); PROVINO, A. (CNR-SPIN, Genova, Italy); SIRI, S. (CNR-SPIN, Genova, Italy); VIGNOLO, M. (CNR-SPIN, Genova, Italy); CAPRA, M. (University of Genova, Italy); MANFRINETTI, P. (University of Genova, Italy); BALLARINO, Amalia (CERN); HOPKINS, Simon (CERN); CAPRA, M. (University of Genova, Italy); MANFRINETTI, P. (University of Genova, Italy); SYLVA, G. (University of Genova, Italy)

Presenter: PUTTI, Marina (University of Genova)

Session Classification: Magnets

Track Classification: EASItrain