Contribution ID: **500** Type: **Contributed Oral Presentation**

RRP® Nb3Sn Wire Optimization with Bruker-OST

Monday 10 July 2017 17:15 (15 minutes)

For cost-effective 15-16 T accelerator magnets, the critical current density Jc(15T,4.2K) of commercial Nb3Sn composite wires has to be pushed from the present state-of-the-art for RRP® wires of ˜1,650 A/mm2 to ˜2,000 A/mm2. Only so much improvement can be obtained through heat treatment optimization. Wire development was therefore carried out in collaboration with Oxford Instruments - Superconducting Technology (OST), which produced three R&D billets to optimize design and layout parameters of their trademarked RRP® process. These wires were studied and characterized virgin and deformed to at a number of sizes through flat-rolling process. The virgin OST 169-restack conductor within this study had an average Jc(4.2K, 16T) ˜ 1,300 A/mm2 and its cost was ˜$1,700/kg. This was obtained with a Nb to Sn ratio of 3.4:1, which corresponds to ˜53%at. Nb, which is presently the achievable upper limit for Nb content in a wire. Results indicate that the Jc of Nb3Sn wires has plateaued. It is clear that to achieve the cost reduction required in magnets for a Hadron Collider, the target increase in Jc can only be achieved by disruptive progress, and that for this reason it is now necessary to invest in research aimed at improving the inherent flux pinning of Nb3Sn.

Authors: BARZI, Emanuela (Fermilab); LI, Pei (Fermi National Accelerator Laboratory); XU, Xingchen (Fermi National Accelerator Lab); TURRIONI, Daniele (Fermilab); Dr ZLOBIN, Alexander (Fermilab)

Presenter: BARZI, Emanuela (Fermilab)

Session Classification: M1OrF - Focused Session: Pushing Nb3Sn Conductors Beyond the State of the Art