



Contribution ID: 427

Type: **Poster**

M2Po3C-05: Progress of APC and high Cp Nb₃Sn conductors in Hyper Tech

Tuesday 20 May 2025 14:00 (2 hours)

In this paper we will update the progress of the two types of advanced Nb₃Sn conductors manufactured in Hyper Tech. One is ternary APC (Artificial Pinning Center) Nb₃Sn strand by using internal oxidation technique to increase J_c in high field and lower the magnetization in low field; The other one is high specific heat (C_p) Nb₃Sn strand to increase the energy margin against quenching by adding certain high C_p material in the strands. We are working on making kilometer length of both types of wires. The ternary APC Nb₃Sn conductors with Ta and either Zr or Hf doping demonstrated substantial grain refinement and significantly increased J_{c,nonCu}, while retaining the high B_{c2} values of the best ternary Nb₃Sn conductors. These APC conductors reached the FCC J_c specification for both 61-stack and 217-stack wires. Compared with standard Nb₃Sn, APC conductors have higher Birr and B_{c2}, and their F_{p,max} shifts to higher field. These two effects lead to flatter J_c-B curves, which enhances J_c at high fields (e.g., >10 T) but reduces J_c at low fields (e.g., < 5 T). This reduces magnetization at low fields, which is very desirable for suppressing low-field flux jumps, field errors, and a.c. loss. We successfully made kilometer length of high specific heat Nb₃Sn conductors and demonstrated the C_p of the Wire is 10 times of the control wire at 1.9 K, and 4 times at 4.2 K, which will increase energy margin of the conductor.

Author: Dr PENG, Xuan

Co-authors: WAN, Fang (Fermi National Accelerator Lab); RINDFLEISCH, Matt (Hyper Tech Research); SUMP-TION, Mike; TOMSIC, Mike; XU, Xingchen (Fermi National Accelerator Lab)

Presenter: Dr PENG, Xuan

Session Classification: M2Po3C - Nb-Based Superconductors