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Progress on Nb₃Sn conductor development in Japan

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"The development of Nb₃Sn high-field conductor has been executed based on a CERN-KEK collaborative agreement. The scope of the development programme of Nb₃Sn high-field conductor is to develop, produce, in representative lengths, and characterize Nb₃Sn strand with enhanced characteristics. The final goal is to achieve, in representative unit lengths of material, the following development targets on the basis of magnets performance, for the Nb₃Sn conductor:

- a) A non-copper critical current density at 4.2 K and 16 T (J_c (4.2 K, 16 T)) of at least 1500 A/mm²;
- b) A strand diameter of not more than 1 mm;
- c) A fraction of stabilizer to superconductor in the strand of about 1;
- d) An equivalent diameter of the superconducting Nb₃Sn filaments of less than 50 m;
- e) A low electrical resistivity of the copper stabilizer of the strand, i.e. a Residual Resistivity Ratio (RRR) of the copper after strand reaction of above 150.

Based on the agreement, KEK started the R&D program in collaboration with Japanese universities; Tohoku University and Tokai University, and Japanese manufacturers; JASTEC and Furukawa electric. Two technologies are chosen as primary candidates, one is the JASTEC distributed Tin (DT) method and the other is Nb tube method by Furukawa. Several R&D wires were already produced and intense characterization of the wires were made by Japanese collaboraters as well as by CERN.

The current status of the program will be reported.

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