

2212 – a few updates

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2023/01/18

First US MDP-era 2212 Rutherford cable transverse pressure experiment completed at Twente

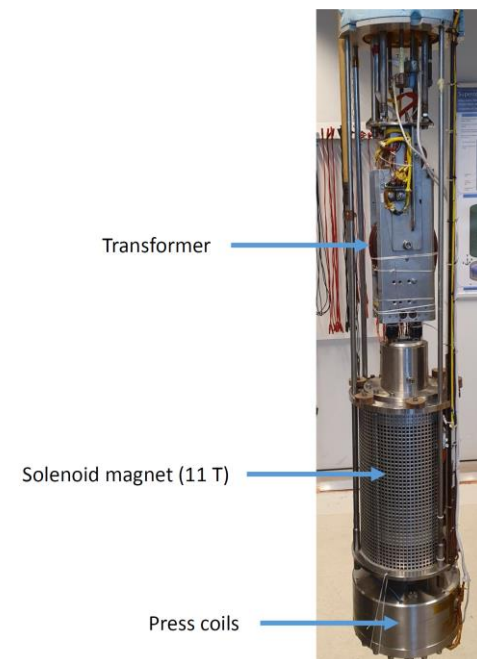
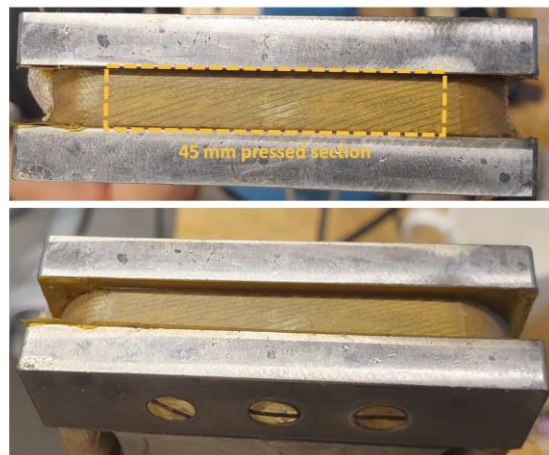
- OPHT by U. Trociewitz and D. Davis et al. at NHMFL.
- Test by S. Otten, J. Leferink, S. Wessel, A. Kario, H. ten Kate at Twente.
- Funding to Twente provided by CERN.
- **Critical transverse pressure well exceeds 125 Mpa.**
- **Second sample will be LBNL1109 as well. Preparation will start after completion of Bi-CCT1ILb winding.**

Cable No.	Specifications	Wires	Insulated	Use
LBNL1109	17-strand subscale magnet and CCT magnet cable, nominal 7.8 mm x 1.4 mm	Nontwisted PMM180207_4, 5, 6, 7, 55x18, 0.8mm, Engi-mat powder LXB103	YES	Wound into the 85 cm long 3.5 T Bi-CCT1 dipole; a sibling cable (LBNL1110, twisted strand) used in the 4.7 T common coil dipole magnet RC7n8



Removing the cable from the reaction sample holder.

Sample surface after impregnation



UNIVERSITY OF TWENTE.



The need for conductor at LBNL and answering CPRD questions

- We are completing fabrication of the first Bi-CCT1 coils (out of LBNL1109 and PMM180207, a 0.8 mm, a good strand) and planning for Bi-CCT2 coils.
 - A second cable (17 strand, 7.8 mm wide cable, 0.8 mm strand PMM190118) is left for a second Bi-CCT1 coils.
 - PMM190118 comes with a weakness – its processing temperature window is narrow. J_e drops from 1350 A/mm² to 800 A/mm² with processing temperature.
- Two strands (1.0 mm, 55 x 18, PMM211005 and PMM220329, 2021 CPRD PO7596379) are available for the first Bi-CCT2 coils but with subpar performance ($J_e(4K,5T)$ is at ~850 A/mm², instead of >1000 A/mm²).
 - Partly to have an enlarged processing temperature window and a larger AgMg wall thickness.
 - Partly to explore a wider cable (with a larger current carrying capability).
- Bi-CCT1 – 5.5 kg per magnet.
- Bi-CCT2 – 8.2 kg per magnet (10.1 mm wide cable, 1.0 mm strand) or 10 kg per magnet (12.3 mm wide cable, 1.0 mm strand)

All cited J_e values are OPHT wire data. Courtesy of Dr. Jianyi Jiang, NHMFL.

Some recent (not a complete list) publications

PHYSICAL REVIEW ACCELERATORS AND BEAMS **25**, 122401 (2022)

Design, fabrication, and characterization of a high-field high-temperature superconducting Bi-2212 accelerator dipole magnet

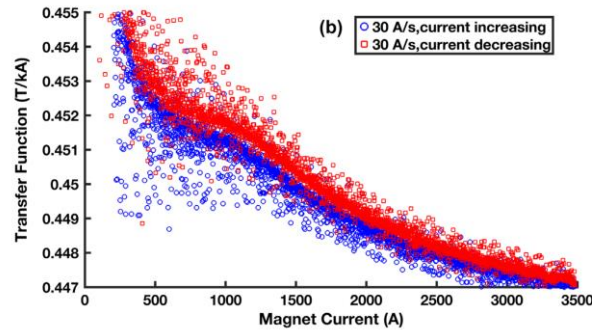
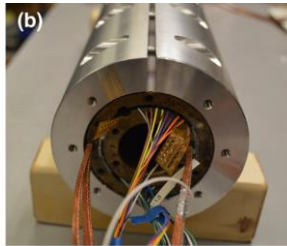
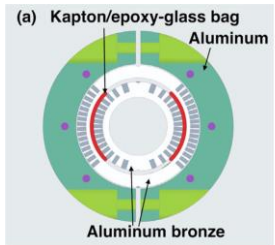
Tengming Shen^{1,*}, Laura Garcia Fajardo², Cory Myers¹, Aurelio Hafalia, Jr.², Jose Luis Rudeiros Fernández¹, Diego Arbelaez², Lucas Brouwer¹, Shlomo Caspi², Paolo Ferracin¹, Stephen Gourlay¹, Maxim Marchevsky¹, Ian Pong¹, Soren Prestemon², Reed Teyber¹, Marcos Turqueti², Xiaorong Wang¹, Jianyi Jiang³, Ernesto Bosque³, Jun Lu³, Daniel Davis³, Ulf Trociewitz³, Eric Hellstrom³, and David Larbalestier³

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Performance and Microstructure Variation with Maximum Heat Treatment Temperature for Recent Bi-2212 Round Wires

Jianyi Jiang, Senior Member, IEEE, S. Imam Hossain, Shaon Barua, T. Abiola Oloye, Jozef Kvitkovic, Fumitake Kametani, Ulf P. Trociewitz, Senior Member, IEEE, Eric E. Hellstrom, Senior Member, IEEE, David C. Larbalestier, Fellow, IEEE, Daniel E. Bugaris, Claudia Goggin, Yibing Huang, Jeff A. Parrell, and Tengming Shen, Senior Member, IEEE

Page 1 of 5
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draft

Under review.

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Mechanical analysis, assembly, and integration of a Nb₃Sn and a Bi-2212 dipole magnet for a hybrid magnet test

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- Wire was twisted while cabling.