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## **Tue-Af-Po2.14-10 [10]: Fatigue behavior of No-Insulation Coils with and without Reinforcing Co-Wind**

*Tuesday 24 September 2019 14:00 (2 hours)*

The NHMFL has commenced with the development of an all-superconducting 40 T magnet that will be installed in its DC-Field User Facility. At present various high temperature superconductor technologies are being investigated as candidates for the magnet construction. It is the objective of this early development stage to address questions regarding the application of a type of superconductor to magnet technology through model coil testing and properties measurements. No-insulation (NI) REBCO is a viable conductor and coil configuration for the 40 T magnet but needs further studies to reduce risk and to better understand its ability to perform reliably through long term user operations. The research presented here is focused on the fatigue effects of 500 A, 4 kJ NI test coils with and without reinforcing stainless steel co-wind. The coils contain six double pancakes with an inner diameter of 100 mm and will be operated to strain levels up to 0.4 % in a background field of 6.9 T. The impact of electromagnetic cycling on the REBCO will be studied using Yatestar which is a device that provides a full-length image of the REBCO's superconducting state via magnetization and transport measurements. The REBCO surface of a non-reinforced coil is oxidized to prescribe a contact resistance and its robustness to the cyclic behavior will be assessed. In addition, the relevance of cracks in the REBCO crystal on the slit-side of the REBCO tape will be examined.

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