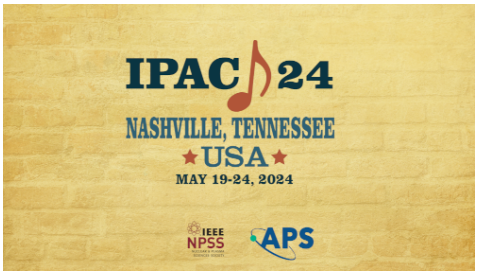

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Mechanical design of the 12 T superconducting dipole. An accelerator-fit, Nb3Sn double aperture magnet

Wednesday, 22 May 2024 16:00 (2 hours)

In the context of the High Field Magnet programme, the 12 T Nb3Sn activity aims to design and manufacture a 2-meter-long, 12 T, cosθ, double aperture dipole. To reach magnetic fields higher than 10 T in accelerator magnets, brittle epoxy-impregnated Nb3Sn Rutherford cables are employed, which makes it difficult to predict the coil's mechanical limit and, in extenso, the magnet's performance. To tackle this challenge, expensive procedures are often implemented. The 12 T mechanical design presented in this paper aims to prioritize intrinsically safe structures and minimize the number of components. This approach is intended to counteract issues stemming from fabrication tolerances and assembly tool misalignment. To prevent coil over-compression, mechanical stoppers are integrated within the magnet structure. The design is committed to focus on solutions that can be applied on short demonstrators but also scaled to long magnets that need to be produced in large quantities in series. This paper aims to introduce the magnet's mechanical design, its underlying principles, and the advantages it offers.

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