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Status of the High Field Accelerator Magnet Program at IHEP-CAS

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High energy proton colliders towards 100 TeV are proposed these years to study the physics beyond the Standard Model. The colliders call for 16-24 Tesla (T) accelerator magnets to bend and focus the particle beams. IHEP-CAS has been engaged in developing high field magnet technology with Nb₃Sn and HTS materials from 2014: several model dipoles have been developed with combined common coil configuration, and advanced iron based superconducting (IBS) technology is being promoted in collaboration with IEE-CAS. The highest field of model dipoles reached 12.47 T in two apertures at 4.2 K in 2021. A new model dipole aiming for 16 T in the aperture is under fabrication. The magnet consists of 6 Nb₃Sn coils and 4 HTS coils: the Nb₃Sn coils with common coil configuration are expected to provide a dipole field of 13-14 T, and the HTS insert coils wound with block configuration and a new type of transposed ReBCO cable are expected to provide a dipole field of 3~4 T with 13-T background field. Moreover, development of high current IBS cables and high field model coils are ongoing: 2 kA IBS transposed cable has been successfully fabricated, and the IBS model coils reached 60 A critical current at 32 T background field. An overview of the high field accelerator magnet program at IHEP-CAS, present progress and the plan for future will be presented.

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