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CERN North Area Multi-Purpose Superconducting Magnet Facility

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The CERN EP department has launched an R&D program on the next generation particle detectors and magnets. In this context a superconducting magnet is designed for a multi-purpose beam test facility to be used for detector prototype testing. The facility will serve as a replacement of the existing M1 and Morpurgo magnets that have been in operation since the late 70s in the experimental north area at CERN. The facility is envisioned to serve all the testing requirements for the following 50 years.

The magnet will have a central field of 4 Tesla with a free-bore diameter of 1.4 meters. The magnet will take either the form of a split solenoid, allowing dual use as a dipole or solenoid, or a skateboard tilted racetrack design, allowing dipole function. It is envisioned to use Niobium Titanium Rutherford cables with a Nickel-Aluminium stabiliser. The operation temperature will be 4.5 K with liquid Helium cooling. The stray fields are being minimised to stay below 15 mT at a distance of 5 m from the central point. The magnet will also incorporate bespoke Persistent Current Switches studied and developed in-house and well as possible inclusion of cryo-coolers.

The North Area Superconducting Magnet facility is an important project for the testing and development of future detectors and electronics at CERN, specifically components that will be utilised in the Future Circular Collider (FCC), the new 100 km collider to be built at CERN. This innovative facility therefore will serve as an important step for the future activities of CERN and High Energy Physics.

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