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Magnet R&D for the Muon Collider

The Muon Collider, proposed under the International Muon Collider Collaboration (IMCC), represents a groundbreaking advancement in circular collider technology. By using muons instead of protons or electrons, this collider has the potential of unprecedented discovery reach, luminosity, and compact design, significantly increasing energy efficiency, reducing environmental impact and improving sustainability. However, achieving this vision necessitates overcoming unique and extreme challenges in superconducting magnet technology. This document summarizes the state of the art, challenges, and the proposed R&D roadmap for developing the next generation of superconducting magnet systems crucial for the Muon Collider over the next ten years. The goal is to advance accelerator magnet technology beyond current limits, with a special focus on High-Temperature Superconductors (HTS) materials for high-field and high-temperature applications. This note is a concise summary of the extensive proposal [BOT-2025] which we refer to for detailed referencing and as supporting material. We focus here on the technology gap to be filled by the proposed R&D, the structure and objectives of the proposed R&D, and provide the resource estimate for the next ten years.

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