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## Collider magnets (incl. muon collider)

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The Muon Collider, one of the options considered for the future of particle physics at the energy frontier, poses many challenges to accelerator technology. The magnets for the muon beam production, acceleration and collision are one of the most demanding systems, for many reasons. Firstly, collider performance in terms of energy and luminosity translates in the demand for high fields, high field rates, and large apertures, thus challenging magnet science and engineering well beyond state-of-the-art. At the same time, the operating environment is very harsh: the decay of highly energetic muons, whose products are difficult to shield, results in large heat and radiation loads to be managed efficiently. Finally, a Muon Collider, as any other future collider at the energy frontier, needs to be affordable and produce sustainable science. The magnets, the single system with the largest cost and power figures, are naturally at the center of the attention also from this point of view. We base this note on analytical and scaling relations to indicate what and how the magnet challenges of the Muon Collider can be mastered, and what needs to be done. Most interesting, addressing magnet technology challenges for a Muon Collider will benefit any future collider at the energy frontier, as well as many other fields of scientific and societal application of magnet technology.

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