Contribution ID: **122** Type: **Regular Oral (15m)**

Cryogenic options for future accelerators: case study for the Muon Collider ring

Tuesday 23 July 2024 17:00 (15 minutes)

Future, multi-km particle accelerator projects will be under heavy scrutiny to be energetically sustainable. Compared to previous accelerators, these machines must sustain increasingly high beam-induced, static and dynamic heat loads per meter length. These features make the cryogenic infrastructure required for superconducting magnet operation a major cost and energy driver. The choice of a general cooling scheme and associated superconductor temperature operating window that optimizes both is essential. With cost-effectiveness, simplicity, and a lessening of the reliance on cryogen availability and market volatility in mind, the virtues of having magnets that would incorporate conduction cooling, thus avoiding full immersion in helium, and that operate at increasingly higher temperatures are examined.
This study presents an overview of cooling options for collider-type magnets, discussed in the context of the collider ring of the Muon Collider. The main drivers when choosing a cryogenic system for future accelerators are identified, and guidelines for magnet thermal design are established. A conceptual study of cooling schemes that fulfil these guidelines is presented and compared to present and past choices for accelerator magnet cooling.

Submitters Country

Switzerland

Author: TAVARES COUTINHO BORGES DE SOUSA, Patricia (CERN)

Co-authors: NAYDENOV POPOV, Boyan-Kaloyanov (CERN); DELPRAT, Laurent (CERN); VAN WEELDEREN, Rob (CERN); Dr KOETTIG, Torsten (CERN)

Presenter: TAVARES COUTINHO BORGES DE SOUSA, Patricia (CERN)

Session Classification: Tue-Or4

Track Classification: Tracks ICEC 29 Geneva 2024: ICEC 10: Cryogenic applications: large magnet systems