



Contribution ID: 1188 Contribution code: TUPA040

Type: **Poster Presentation**

## Longitudinal beam dynamics and RF requirements for a chain of muon RCSs

*Tuesday, 9 May 2023 16:30 (2 hours)*

A facility for the collision of muons offers a unique path to a compact lepton collider with an energy reach in the multi-TeV regime, well beyond the possibilities of conventional electron accelerators. However, due to the short lifetime of muons, the constraints for acceleration and collisions are very different. An extremely fast energy increase in combination with intense and ultra-short bunches is essential for a high muon survival rate and luminosity. A chain of rapid cycling synchrotrons (RCS) for acceleration from around 60 GeV to several TeV is proposed by the International Muon Collider Collaboration. We study the longitudinal beam dynamics and radio-frequency (RF) requirements for these RCSs with respect to induced voltages from intensity effects. A high synchrotron tune due to the large RF voltages is a particular challenge. We present simulation results of the longitudinal bunch distribution to determine the number of RF stations distributed over the RCS to mitigate that large tune. The impact of the induced voltages from short-range wakefields and single- as well as multi-turn beam loading is analyzed, for both fundamental and higher-order modes.

### Funding Agency

### Footnotes

### I have read and accept the Privacy Policy Statement

Yes

**Primary author:** BATSCHE, Fabian (European Organization for Nuclear Research)

**Co-authors:** AMORIM, David (European Organization for Nuclear Research); CARLI, Christian (European Organization for Nuclear Research); DAMERAU, Heiko (European Organization for Nuclear Research); GRUDIEV, Alexej (European Organization for Nuclear Research); KARPOV, Ivan (European Organization for Nuclear Research); MÉTRAL, Elias (European Organization for Nuclear Research); SCHULTE, Daniel (European Organization for Nuclear Research); CHANCE, Antoine (Commissariat à l'Energie Atomique et aux Energies Alternatives)

**Presenter:** BATSCHE, Fabian (European Organization for Nuclear Research)

**Session Classification:** Tuesday Poster Session

**Track Classification:** MC3: Novel Particle Sources and Acceleration Techniques: MC3.A09: Muon Accelerators and Neutrino Factories