

# Transverse Collective Effects studies for a Muon Collider

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The International Muon Collider Collaboration (IMCC) is investigating the key challenges of a 10 TeV center-of-mass muon collider ring, along with its injector complex and an intermediate 3 TeV collider stage. Muon and anti-muon bunches are produced via a proton driver complex and then undergo 6D cooling. The bunches are then accelerated before entering the collider ring by a series of Linacs, recirculating Linacs and Rapid Cycling Synchrotrons (RCS).

Collective effects are a concern due to the high charge of the muon bunches. The RCS require a significant number of RF cavities to rapidly accelerate the beams and keep a 90% survival rate in each ring. The effect of the cavity high-order modes was evaluated using start-to-end simulations that included collective effects. The collider would be an isochronous ring to preserve a short bunch length. The study also examined the impact of this operation on transverse coherent stability, and potential methods for mitigating instabilities.

## Alternate track

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Yes

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