



Contribution ID: 1667 Contribution code: WEPL191

Type: **Poster Presentation**

Beam Breakup Studies for the C3 Linear Collider

Wednesday, 10 May 2023 16:30 (2 hours)

High luminosity electron-positron linear colliders constitute a fundamental instrument in the field of elementary particle physics. The “Cool copper collider”, or C3, is a proposal for a 250 COM GeV Higgs factory, with possible extension to the TeV-scale, and it represents a promising candidate for the near future high energy physics. The C3 infrastructure is conceived as a modular facility utilizing cryogenic, distributed coupling standing wave accelerating sections. Interestingly, the independent feeding scheme allows for arbitrary phase advance among consecutive linac cells. The latter becomes part of the parameter space affecting the optimal acceleration and, thus, configurations alternative to the standard standing wave pi-mode can be investigated. Here we use the tracking code MILES to study both short and long-range beam breakup effects in various phase advance scenarios. The analyses include the intermediate stages of the facility starting from a simple 3 GeV demonstrator as well as the 250 and 550 GeV working points. Further, possible mitigation techniques are aimed at establishing the tolerance for the alignment of the accelerating structures.

Funding Agency

This work is supported by DARPA under Contract N.HR001120C0072, by DOE Contract DE-SC0009914 and DE-SC0020409, by the NSF Grant N.PHY-1549132 and by INFN through the project ARYA.

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Session Classification: Wednesday Poster Session

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D05: Coherent and Incoherent Instabilities Theory, Simulations, Code Developments