



Contribution ID: 1467 Contribution code: MOPL053

Type: **Poster Presentation**

A booster free from spin resonances for future 100 km-scale circular e+e- colliders

Monday 8 May 2023 16:30 (2 hours)

Acceleration of polarized electron and positron beams to ultra-high beam energies is of interests for polarized beam applications in future 100km-scale e+e- circular colliders. However, it was widely envisaged that crossing hundreds of spin depolarization resonances would lead to severe depolarization during the energy ramp in the booster synchrotron. In this work, we have studied the spin resonance structure of a booster lattice for the Circular Electron Positron Collider (CEPC). The 100 km-scale booster lattice has a periodicity of 8 and each arc region contains hundreds of FODO cells. We show that the first super strong depolarization resonances only occur beyond 120 GeV, and other resonances are much weaker, due to the effectively very high periodicity of the lattice structure in terms of spin resonances. This finding is similar to the concept of “Spin resonance free injector” for the Electron Ion Collider [V. Ranjbar, Phys. Rev. Accel. Beams, 20, 111003, 2018]. Spin tracking simulations verify that beam polarization can be mostly maintained in the fast ramping to 45.6 GeV and 80 GeV beam energies, without using special hardware like Siberian snakes. We also discuss possible measures to maintain beam polarization up to 120 GeV. This study opens the way for injection of highly polarized beams generated from the source into the collider rings, to enable resonant depolarization measurements as well as longitudinally polarized colliding beam experiments.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: CHEN, Tao (Chinese Academy of Sciences)

Co-authors: DUAN, Zhe (Institute of High Energy Physics); JI, Daheng (Institute of High Energy Physics); WANG, Dou (Chinese Academy of Sciences)

Presenter: CHEN, Tao (Chinese Academy of Sciences)

Session Classification: Monday Poster Session

Track Classification: MC1: Colliders and other Particle Physics Accelerators: MC1.A02: Lepton Circular Colliders