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## Beam backgrounds at the CEPC

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The machine-detector interface (MDI) issues are one of the most complicated and challenging topics at the Circular Electron Positron Collider (CEPC). Comprehensive understandings of the MDI issues are decisive for achieving the optimal overall performance of the accelerator and detector. The CEPC machine will operate at different beam energies, from 45.5 GeV up to 180 GeV.

A flexible interaction region design will be plausible to allow for the large beam energy range. However, the design has to provide high luminosity that is desirable for physics studies but keep the radiation backgrounds tolerable to the detectors. In this paper, the latest design of the CEPC MDI based on the TDR draft will be presented, covering the following topics:

1. The design of the beam pipe, which would foresee several constraints: In the central region ( $z = \pm 12$  cm), it should be placed as close as possible to the interaction point and with a minimal material budget. But it should still stay far away enough not to interfere with the beam backgrounds.
2. The estimation of beam-induced backgrounds. A detailed simulation covering the main contributions from synchrotron radiation, pair production, and off-momentum beam particles has been performed.
3. The suppering/mitigating schemes. A preliminary design of the collimation scheme has been studied, including the position, material, shape of the collimators, and also the effectiveness of them.

### Funding Agency

### Footnotes

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

Yes

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