

# CEPC accelerator physics challenges and research progress

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The Circular Electron-Positron Collider (CEPC) is a dual-ring accelerator with a design circumference of 100 kilometers, prioritizing operation at the Higgs particle energy (center-of-mass energy of 240 GeV). To achieve its high-luminosity collision goals, the CEPC accelerator physics team addresses core challenges through design optimization, including beam optics design under strong radiation effects to ensure sufficient beam lifetime, simulation and mitigation of collective effects and nonlinear dynamics from intense beam-beam interactions, development of efficient injection methods despite short beam lifetimes, luminosity optimization for ultra-high energy beams, self-consistent handling of compound effects with precise component modeling and improved computational efficiency, and high-polarization collision design. The team is now conducting more rigorous and comprehensive performance assessments for the physical design, alongside beam physics experimental validation and specialized software development tailored for CEPC.

## Footnotes

## Funding Agency

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Yes

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