

# Research on higher-order mode suppression in CEPC electrostatic separators

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The electrostatic separator is a key component of circular colliders (such as the CEPC), but the unique geometry of its vacuum chamber excites higher-order modes (HOMs), leading to significant narrow-band impedance. Previous studies have shown that adding absorbing materials at the feedthrough (holder) terminals of the electrostatic separator can effectively suppress HOMs, thereby improving the multibunch coupled instability threshold in the CEPC. However, since the electrostatic separator of the CEPC must operate in the magnetic field environment generated by bending dipoles magnets, the solution of adding absorbing materials at the feedthrough cannot be implemented. Therefore, new damping schemes must be explored, and non-magnetic materials must be used for the damping material. Based on the CST simulation software, this paper systematically investigates the approach of loading non-magnetic SiC absorbing rings at different positions of the electrostatic separator. Through simulation analysis, the suppression effects of different schemes on the quality factor ( $Q$  value) of HOMs and the transverse impedance are quantitatively evaluated, providing a basis for optimizing the design of the CEPC electrostatic separator and reducing the risk of beam instability.

## Footnotes

## Funding Agency

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