

## Fast simulation of the 4th detector at CEPC with Delphes

The Delphes is a versatile framework simulating multipurpose detector responses. Its speed allows phenomenological studies, parameter space scans, and rapid testing of detector geometries. In this study, the Delphes is used to simulate CEPC's 4th detector, incorporating particle identification with TOF and  $dN/dx$ .

$dN/dx$  represents primary ionizations per length unit, following a Poisson distribution. Unlike the traditional  $dE/dx$ ,  $dN/dx$  exhibits better performance. TOF signifies particle flight time, aiding particle identification capability at low momenta.

Our aim is a fast simulation tool for CEPC performance studies. We've released a beta version simulating CEPC's 4th concept detector. Specifically, we implement a  $dN/dx$  model in Delphes, leveraging up-to-date full simulation  $dN/dx$  outcomes. Subsequently, we perform select physical analyses spotlighting B/Bs decay and explore PID's impact on flavor physics.

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