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Prospects of fast timing detectors for particle identificationat future Higgs factories

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Future e^+e^- colliders are excellent tools to probe fundamental physics beyond Standard Model via Higgs and electroweak precision measurements.

Modern silicon detectors are able to measure time-of-arrival with high precision of O(10 ps). This can be used to measure the time-of-flight (TOF) of the particles and improve their identification.

We develop reconstruction and calibration algorithms based on TOF information to separate $\pi^\pm$, $K^\pm$, p, $\bar{p}$ particles at future Higgs factory detectors. Furthermore, we study how to implement fast timing silicon layers in the tracking and/or calorimeter systems, in order to derive requirements on the time resolution. As an example case, the ILD detector concept is studied.

The $K^\pm$ mass measurement is a simple benchmark to test the performance of TOF algorithm. A precision at the level of 10 keV can be expected, which would significantly improve the knowledge of the $K^\pm$ mass.

Time Zone

Europe/Africa/Middle East

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