Contribution submission to the conference SMuK 2023

Time-of-flight particle identification at future Higgs factories

— •Bohdan Dudar[1,2], Jenny List[1], Annika Vauth[2], and Ulrich Einhaus[1] — [1]Deutsches Elektronen-Synchrotron DESY, Notkestr. 85, 22607 Hamburg, Germany — [2]Universität Hamburg, Hamburg, Germany

It is established that particle identification of charged hadrons with $\gtrsim$ 5 GeV momentum plays an important role at future e^+e^- Higgs factories to achieve outstanding precision in Higgs and electroweak physics, which can be covered by dE/dx (or dN/dx) in a gaseous tracker or RICH. However, at low momentum these methods become inefficient, while also some detectors don't have a gaseous tracker or RICH in their designs at all. Modern Si sensors technologies that can achieve time resolutions of 10 – 30 ps, such as LGADs, allow us to use the time-of-flight technique to identify $\pi^{\pm}$, $K^{\pm}$ and p at low momentum by placing fast timing layers in the ECAL or as an outer tracker. This should enhance the particle identification at the future Higgs factory. Thus, achievable time resolutions of the LGADs together with time-of-flight particle identification technique are interesting points to investigate for the future detector R&D.

In this talk, we present test beam measurements of time resolution of LGAD samples with an electron beam at the DESY II test beam facility, the latest developments of the time-of-flight technique as well as its realistic momentum reach and limitations of integrating it into the detector at a future e^+e^- Higgs factory, using the International Large Detector at the International Linear Collider as an example case.

Part:	**T**
Type:	**Vortrag;Talk**
Topic:	**3.12 Experimentelle Methoden (allg.); 3.12 Experimental Methods (general)**
Email:	**bohdan.dudar@desy.de**