Contribution ID: **42** Type: **not specified**

Study of silicon sensors for precise timing measurement

Tuesday 26 November 2019 17:20 (20 minutes)

We are studying silicon sensors with high time resolution for the particle identification in the International Linear Collider (ILC). In the International Large Detector (ILD), one of two detector concepts for the ILC, particle identification can be achieved with dE/dx measurement with the Time Projection Chamber, but is has insensitive energy range which has similar dE/dx with multiple kinds of particles. With a precise time-of-flight measurement combined with the dE/dx measurement, performance on the particle identification can be improved. In order to identify pions, kaons and protons up to 5 GeV, the time resolution is required to be less than 50 psec. We are studying Low Gain Avalanche Diodes (LGADs) to achieve the resolution.
LGADs already have been proved to realize the time resolution down to 30 psec. However, the normal reach-through LGADs have an issue that the amplification factor heavily depends on the position of the hit, because the amplification region is not uniformly formed due to the surface structure. To overcome this, inverse-type LGADs have been proposed, which has amplification region at the bottom, in contrast to the reach-through type with amplification occurring just below the surface.
As a step to develop LGADs, we are now focusing to characterize Avalanche Photo Diode (APD)s, which are usually used to measure optical photons, with charged particles. Since the APDs has the same multiplication structure as LGADs, this should help determining the structure of the LGADs.
We will present the characteristics of reach-through and inverse type of APDs with particles from radioisotopes. We are also preparing to do a beam test for them. Since it is scheduled just before the conference, we will show a quick look of the results of the test beam.

Primary authors: DEGUCHI, Yuto (Kyushu University); KAWAGOE, Kiyotomo (Kyushu University (JP)); SUEHARA, Taikan (Kyushu University (JP))

Presenter: DEGUCHI, Yuto (Kyushu University)

Session Classification: Sensors