

Development of double SiPM readout method for ILD scintillator electro- magnetic calorimeter

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One of the concepts for detector mounted on the interaction point of ILC is International Large Detector (ILD). Sc-ECAL is a proposed option for the electromagnetic calorimeter of ILD based on $5 \times 45 \times 2 \text{ mm}^3$ plastic scintillator strip readout by SiPM. Virtual $5 \times 5 \text{ mm}^2$ segmentation is realized by x-y configuration of strips.

SiPMs with small cell pitch such as 10 and 15 μm are required for Sc-ECAL to have a wide dynamic range, but S/N is not good enough due to low gain of the MPPC with small cells.

In order to improve the performance of the scintillator strip, we are developing a new SiPM readout method for the scintillator strip for Sc-ECAL where the scintillator strip is readout by two SiPMs at the strip ends. This technique allows us to eliminate noise by taking coincidence between two MPPCs and thus to improve S/N. A higher light yield is also expected by summing two MPPC signals. Possibility of position reconstruction by using the two MPPC signals is also investigated, although it might be challenging.

A large technological prototype for Sc-ECAL is being constructed as a joint effort with Chinese groups working on CEPC. We are proposing to add detection layers with double SiPM readout to the prototype. We have tested the prototypes for the scintillator strip with double SiPM readout with different configurations. The measured performance of the prototypes will be presented.

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