

11th International "Hiroshima" Symposium on the Development and Application of Semiconductor Tracking Detectors (HSTD11) in conjunction with 2nd Workshop on SOI Pixel Detectors (SOIPIX2017) at OIST, Okinawa, Japan

Contribution ID: 20

Type: **POSTER**

A timing detector for the SHiP experiment

Sunday 10 December 2017 21:10 (1 minute)

SHiP is a proposed general purpose fixed target experiment to be located at the CERN SPS accelerator. A fixed target station will be followed by magnetic shielding to reduce beam induced background, a dedicated tau neutrino detector and a detector to search for hidden particles beyond the Standard Model. Background taggers and a dedicated timing detector will ensure sufficient background rejection. The timing detector is required to have a timing resolution of 100 ps or less in order to reduce combinatorial di-muon background to an acceptable level. A proposed option for such a timing detector consists of plastic scintillating bars read-out on each end by silicon photomultipliers, which is the focus of this study. Test beam results comparing different bar geometry and material type, different number of silicon photomultipliers on either end of the bar, as well as a new ASIC used for read-out are presented and discussed.

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Session Classification: POSTER

Track Classification: New ideas and future applications