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## Development of SiPM based fast time of flight for the AMS-100 in space

AMS-100 is one of the next generation high energy cosmic-ray experiment in space as a successor of AMS-02 and has a potential of improving the sensitivity by a factor of 1000 for the cosmic antimatter particles AMS-100.

It is designed as a magnetic spectrometer with a large geometrical acceptance of 100m<sup>2</sup> sr and to be operated for ten years at Sun-Earth Lagrange Point 2.

It consists of a TOF, a thin solenoid Magnet based on HTS tapes, SciFi- and Si-Trackers, an EM Calorimeter with a Preshower in the cylindrical shell structure.

The TOF is a crucial sub-detector for the main trigger. It requires a fast timing measurement with a time resolution better than 20 ps in the 2 x 4 thin layers of TOF along the particle trajectory.

A test setup of TOF is designed based on small size (Kuraray 87mm x 30mm x 5 mm) of fast plastic scintillator tile and multi arrays of SiPM (Hamamatsu S14161-6050HS-04).

An amplifier board is built to merge 16 SiPM arrays into 4 readout channels in Hybrid connection and has single HV module communicated with a SPI protocol via onboard USB controller. The amplified signals are readout by the fast waveform digitizer (DRS4).

We have studied the timing performance using UV LED pulses and investigated time resolution with beta rays from a radioactive source (<sup>90</sup>Sr).

We will report on time resolution measured better than 50 ps and timing effects in various conditions of scintillator, SiPM and readout electronics.

**Primary authors:** CHUNG, Chan Hoon (Rheinisch Westfaelische Tech. Hoch. (DE)); DITTMAR, Clemens; LOUIS, Daniel (Rheinisch Westfaelische Tech. Hoch. (DE)); SCHWERING, Georg (Rheinisch Westfaelische Tech. Hoch. (DE)); KIRN, Thomas (Rheinisch Westfaelische Tech. Hoch. (DE)); KARPINSKI, Waclaw

**Presenter:** CHUNG, Chan Hoon (Rheinisch Westfaelische Tech. Hoch. (DE))