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1 Characterization of Hamamatsu 64-channel TSV SiPMs

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5 Germany6 ^bDESY, 15735 Zeuthen, Germany7 **Abstract**

8 The Hamamatsu UV-light enhanced 64-channel SiPM array of the newest
9 generation (*S13361-3050AS-08*) has been examined for the purpose of being
10 used for the Silicon Elementary Cell Add-on (SiECA) of the EUSO-SPB bal-
11 loon experiment. At a room temperature of 19.5°C, the average measured
12 breakdown voltage of the array is (51.65 ± 0.11) V, the average gain is mea-
13 sured to $(2.10 \pm 0.07) \cdot 10^6$ and the average photon detection efficiency results to
14 $(44.58 \pm 1.80)\%$ at a wavelength of (423 ± 8) nm and a bias voltage of 55.2 V. The
15 average dark-count rate is (0.69 ± 0.12) MHz, equivalent to a dark count rate
16 per SiPM area of (57 ± 12) kHz/mm², and the crosstalk probability is measured
17 to $(3.96 \pm 0.64)\%$. These results confirm the information given by the manufac-
18 turer. Measurements performed with the newly installed Single Photon Cali-
19 bration Stand at KIT (SPOCK) show the improved sensitivity to photons with
20 wavelengths lower than 400 nm compared to the SiPM array *S12642-0808PA-50*,
21 which was also investigated for comparison. Additional measurements confirm
22 the strong temperature dependence of the SiPM characteristics as given in the
23 data sheet. All the characterized parameters appear to be sufficiently uniform to
24 build up a focal surface of SiPM arrays fulfilling the requirements for a telescope
detecting photons in the UV range.

25 **Keywords:** SiPM, EUSO, Cosmic rays, Air-showers, fluorescence detection

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