

Recent development on the realization of a 1-inch VSiPMT prototype

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The VSiPMT (Vacuum Silicon PhotoMultiplier Tube) is an innovative design for a revolutionary hybrid photodetector. The idea, born with the purpose to use a SiPM for large detection volumes, consists in replacing the classical dynode chain with a SiPM. In this configuration, we match the large sensitive area of a photocathode with the performances of the SiPM technology, which therefore acts like an electron detector and so like a current amplifier. The excellent photon counting capability, fast response, low power consumption and great stability are among the most attractive features of the VSiPMT. In order to realize such a device we first studied the feasibility of this detector both from theoretical and experimental point of view, by implementing a Geant4-based simulation and studying the response of a special non-windowed MPPC by Hamamatsu with an electron beam. Thanks to this result Hamamatsu realized two VSiPMT industrial prototypes with a photocathode of 3mm diameter. We now present an overview of the full characterization of the VSiPMT industrial prototypes with an analysis of their pro and contra. We also present the progress on the realization of a 1-inch prototype and the preliminary tests we are performing on it.

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