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## Direct comparison of SiPM and PMT operation under bright background and perspectives of using truly digital sensors

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The maximum photon detection efficiency (PDE) of silicon photomultipliers (SiPMs) can be comparable to or even exceed that of photomultiplier tubes (PMTs). There are experiments where the signal is measured in the presence of strong background light. Considering PDE alone can lead to wrong conclusions and results, one needs to accurately assess the signal-to-noise ratio. Imaging atmospheric Cherenkov telescopes (IACTs) observe in the presence of strong light of the night sky. It is interesting to directly compare SiPM performance in IACTs with that of PMTs, without any assumptions. For this purpose, we performed long-term tests by using the 17m diameter MAGIC IACT. For completeness, we used SiPMs from well-known companies EXCELITAS, SensL, and Hamamatsu and compared these with two PMT types from Hamamatsu. From today's perspective, SiPMs are relatively outdated –they are used as classic PMTs, i.e. small signals are amplified and fed into digitizers. SiPM is essentially a digital sensor, but its design does not allow one to benefit from this basic feature. A sensible alternative is the use of purely digital sensors. In this presentation we would like to show the results of comparison as well as address the above- mentioned issue.

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