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## Performance of Photo-Sensors for KM3NeT

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KM3NeT, the future deep-sea neutrino telescope of multi-cubic km size, is being designed to search for high energy neutrinos originating from galactic and extragalactic sources. The neutrinos can be detected by collecting Cherenkov light emitted from relativistic charged secondary particles caused by the interaction of neutrinos with the medium surrounding the detector. To collect the Cherenkov light, an optical module (OM) containing an array of 31 3-inch diameter photomultiplier tubes (PMTs) has been designed as a promising alternative to an OM containing one 10-inch diameter PMT. The main advantage is to reduce the environmental background by requiring local coincidences between neighbouring photo sensors and to provide a homogeneous photon acceptance. Optimum performance requires high collection efficiency at low dark noise, homogeneous photocathode response and excellent timing properties.

We studied the response to single photo-electrons of a newly developed 3-inch diameter PMT from Electron Tube Enterprises Ltd.. To study the timing and homogeneity of the PMT, we employed a 2D scanning system with a picosecond-laser (timing precision  $< 70$  ps) that illuminates various positions on the photocathode surface.

Results of these investigations indicate good photocathode homogeneity, low dark noise on the sub-kHz level, and an average transit-time spread below 2ns. The expected performance in the Multi-PMT optical module of the future KM3NeT detector will be discussed.

### Summary

For the Multi-PMT optical module of KM3NeT a newly developed 3-inch diameter PMT has been evaluated with strong requirements on collection efficiency, dark noise, photocathode homogeneity and timing properties. Results on measurements of performance parameters will be presented.

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