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A new design of large area MCP-PMT for the next generation neutrino experiments

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The next generation neutrino experiments call for significantly increasing the total detector volume. Inexpensive PMTs with large size and high efficiency photocathode are needed in order for these experiments to become reality. We have developed a conceptual design of large focusing type PMT aiming for improving the PMT photon detection efficiency. The transmission photocathode coated on the front hemisphere and the reflection photocathode coated on the rear hemisphere are assembled in the same glass envelope to form nearly 4π viewing angle to enhance the efficiency of the photoelectron detection. The two sets of small MCP units replace the traditional dynodes in the center of the big glass pulp. The photoelectrons from the 4π photocathode are collected and amplified by the two sets of MCP units. Some calculations about the photon-electron moving and collecting are introduced. And the prototypes of this kinds of PMT are being made in China.

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