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Development and characterization of the JNE concentrator

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The Jinping Neutrino Experiment (JNE) plans to deploy approximately 3000 8-inch MCP-PMTs (GDB-6082, North Night Vision Technology) for neutrino detection. To improve photon collection efficiency while maintaining cost-effectiveness, we developed custom-designed light concentrators with a selected cutoff angle of 70°, mounted on each PMT.

We performed angular response measurements of the concentration factor at four wavelengths in air. The results are in good agreement with Monte Carlo simulations, validating the optical performance of the design. Under parallel light source, the concentrators enhance light collection efficiency by approximately 40%, with a marginal increase in transit-time spread (FWHM increase < 0.3 ns).

These findings demonstrate that the proposed concentrator design is effective and practical for use in JNE, offering significant photon collection enhancement with minimal timing degradation.

Collaboration you are representing

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