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**A Study of Afterpulsing in 20" and 17" Phototubes For The KamLAND Neutrino Detector** JOHN CARRUTH, University of Tennessee, Knoxville — Research was done on sample photomultiplier tubes identical to those used in the Super Kamiokande Neutrino Detector in order to determine the precise effects of afterpulsing in decreasing PMT accuracy. The experiment involved 20" and 17" PMTs shielded from external light sources and subjected to single-photon emissions from an LED. Data was acquired using NIM/CAMAC electronics with a gated TDC/ADC setup controlled by a computer running LabVIEW. Data was also acquired using a computer-based oscilloscope program. The number of photons emitted by the LED was changed to determine the effect on the PMTs. Three different types of pulsing were measured: late pulsing, induced afterpulsing, and delayed prompts. The 17" and 20" PMTs were compared to determine relative accuracy. It was determined that for low photon counts, afterpulsing increased linearly with the number of photons in both the 17" and 20" PMTs. However, when the number of photoelectrons in the 20" tube became greater than about 1000, such as from a cosmic ray, the photoelectrons began to exponentially contribute to the afterpulsing effect. The conclusion reached is that large numbers of photoelectrons in the photomultiplier can cause an exponential, even self-sustaining afterpulsing effect. This effectively renders the PMT blind to further neutrino events, and necessitates new techniques for sensing and removing such problem events.

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