Monte Carlo Simulations for a Photomultiplier's One-Photoelectron Response[1] ALEJANDRO DE LA PUENTE[2], BRIAN BECKFORD[2], NAIPY PEREZ, JOERG REINHOLD, Florida International University — Currently, we are conducting small prototype tests as well as Monte Carlo simulations (MC) to investigate the feasibility of employing wavelength shifting plastic and low cost photomultipliers (PMT) for constructing ring imaging Cherenkov detectors (RICH). As the expected light yield is low, a realistic model for the one-photoelectron response of the PMTs is needed. Two Monte Carlo programs were written, one with a realistic description of the amplification chain, and a second approximating the process. Because a fully realistic description is very computing intensive and therefore impractical for implementation into large-scale detector simulations the goal was to determine suitable approximations to the amplification process. Employing the Central Limit Theorem, it was found that the lower stages of the PMT are well described by Gaussian distributions rather than the more realistic Poissonian distributions. This reduces significantly the computing time. In the future, the MC will be used for characterization of the PMTs as well as a generator in a full detector simulation.

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