

The cathode quantum efficiency(QE) Testing System

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Photomultiplier tubes (PMTs), as a kind of light detector with high sensitivity and super fast time response, are widely used in physics experiment, industrial production, medical equipment and other fields. And With the increasingly common use of large area PMTs for nuclear and particle physics experiments, information on the uniformity of photocathode is important to accurate particle identification. Especially in the non-transfer cathode system during the cathode preparation, the antimony ball arrangement and cathode preparation technology always contribute non-uniformity of large area PMTs. A system studying the cathode performance of PMT has been built in our lab. These performance parameters such as quantum efficiency (QE) at specific wavelength, QE spectral response from 200 nm to 1000 nm and cathode uniformity could be measured in this system. Because the size and shape of cathode vary with PMTs, three cathode uniformity scanning setups, one for 2-in PMTs, another for 8-in PMTs, a third for 20-in PMTs were respectively built.

Summary

The higher cathode quantum efficiency(QE) and good cathode uniformity property of PMTs are very important to get globally high photo detection. Utilizing this system, we have successively studied the cathode quantum efficiency(QE), QE spectral response, cathode uniformity of PMTs including the 2-in. XP2020, 8-in. R5912 and 20-in R12860 by two-dimensional, three-dimensional and coupling installation parts in our Lab.

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