

Two-dimensional Simulation of the Electron Transport in a Photomultiplier Tube

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Abstract

Photomultiplier tubes are widely used in experimental physics because they convert small light signals into a measurable electric current. Although their working principle is well known, it is very difficult to find simulations of the electron transport in these devices. For this reason, the electron transport in the Hamamatsu R13408-100 photomultiplier tube has been simulated in 2D. The software SUPERFISH is used for calculating the electrostatic fields and the Boris method for the effective electron dynamics. The secondary electron emission in the dynodes is implemented using an effective electron model and the modified Vaughan's model. Some figures of merit for photomultiplier tubes (*e.g.* the gain, the electron transit time or the transit time spread) in function of the supply voltage and an external magnetic field have been studied obtaining a good qualitative accordance with the Hamamatsu datasheet. In further studies, we are going to compare our simulations with experimental measurements.

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