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Numerical simulation of fast photo detectors based on microchannel plates

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Content

Description of mathematical models for fast photo detectors based on microchannel plates (MCP) in three-dimensional formulation is given. The models include calculations of photoelectron collection efficiency in the gap photo cathode - MCP, gain factor of secondary electron cascades in the channels, the particle scattering in the gaps between the plates, taking into account the edge fields and strong external magnetic fields. For end-to-end modeling through microchannel amplifier the original algorithms and the code "MCS3D" (Monte-Carlo Simulator) were developed, which allow to calculate the gain and the parameters of spatial and temporal resolution of the device.

Summary

Comparison of numerical and experimental data are given. Dependencies of major device parameters vs. of the applied voltage, the diameter and channel length, the magnetic field magnitude were studied.

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