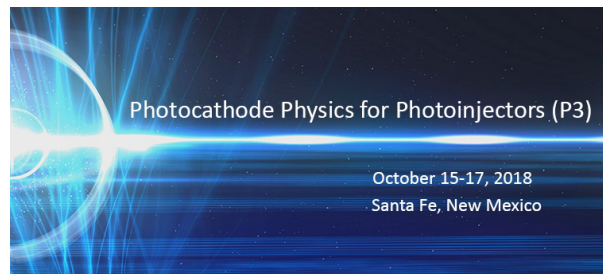


Photocathode Physics for Photoinjectors 2018



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Experimental evaluation and Monte Carlo simulation of the thin GaAs photocathodes

Monday, 15 October 2018 16:45 (20 minutes)

The quantum efficiency (QE) spectral response of five thin GaAs photocathodes with different active layer thickness and dopant density was experimentally evaluated, and to better appreciate the experimental results, a Monte Carlo model was developed to simulate electron transport and emission. The simulation accurately predicts expected behavior, namely QE is enhanced for thicker GaAs photocathodes and for higher dopant concentrations. More significantly, the simulation predicts that electrons excited to the conduction band of the GaAs can be reflected by the AlGaAs barrier layer and contribute to enhanced QE. The simulation also predicts that electrons in conduction band suffer more scattering for thicker GaAs photocathodes and for higher dopant concentration, leading to longer response time. This Monte Carlo model may improve our understanding of the performance of more complicated GaAs-based structures composed of many thin layers.

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