

High-Precision Measurements of Asymmetry and Quantum Efficiency in Photocathodes for Polarised Electron Beam Experiments

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At the new, energy-recovering superconducting accelerator MESA in Mainz, spin-polarised electrons are required in the P2 experiment. Here the requirements increase considerably compared to the experiments at the micotron MAMI in Mainz.

A very sensitive part of the photocathodes lies in the specially prepared surface, characterised by its negative electron affinity. This surface is highly sensitive to residual gases in vacuum and subjected to ion back bombardment.

Traditionally, this negative electron affinity is achieved through a preparation involving caesium and oxygen. Beam current losses induce a degradation of quantum efficiency and, in addition, the spin polarisation undergoes significant change.

The exploration of the intricate relationship between asymmetry and quantum efficiency bears considerable importance, especially for the P2 experiment.

Our aim is to clarify this connection and its implications, offering insights into managing spin polarisation and quantum efficiency in photocathodes.

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