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Modeling Photoemission of Spin-Polarized Electrons from NEA GaAs Photocathodes[1] OKSANA CHUBENKO, ANDREI AFANASEV, George Washington University — At present, photoemission from strained GaAs activated to negative electron affinity (NEA) is a main source of polarized electrons for modern nuclear-physics and particle-physics facilities. Future experiments at advanced electron colliders will require high-current polarized electron beams, which could provide high polarization and luminosity. This sets new requirements for photocathodes in terms of high quantum efficiency (QE) ($\gg$1%) and spin polarization ($\sim$85%). Detailed simulation and modeling of physics processes in photocathodes is important for optimization of their design in order to achieve high QE and reduce depolarization mechanisms. The purpose of the present work was to develop a semi-phenomenological model, which could predict photoemission and electron spin polarization from NEA GaAs photocathodes. Effect of the presence of nanostructures was also studied. Simulation results were compared to the experimental results obtained by the polarized electron source group at Thomas Jefferson National Accelerator Facility.

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