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Lifetime Measurements of GaAs photocathodes at the Upgraded Injector Test Facility at Jefferson Lab*

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Photocathodes based on GaAs can be used in photo-electron sources to supply spin-polarized, high-current electron beams for various applications. An activation, adding a thin surface layer, is needed to achieve negative electron affinity (NEA) for such cathodes. Typically, Cs is used in combination with an oxidant. Previous studies have suggested that the addition of Li to this process can increase the quantum efficiency (QE) of the cathode as well as the lifetime of the cathode surface layer, both crucial parameters for photo-electron source operation.
Recently, first lifetime studies of bulk GaAs photocathodes activated with Cs, NF3, and Li have been conducted using the photo-electron gun of the Upgraded Injector Test Facility (UITF) at the Thomas Jefferson National Accelerator Facility (JLab), extracting beam currents of up to 100 µA. We will present the results of these measurements as well as planned measurements at the Institut für Kernphysik of Technische Universität Darmstadt.

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Summary

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