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Cryogenic GaAs cathodes development for improved lifetimes

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GaAs photocathodes provide a source of highly polarized electron beams. To ensure reliable operation for high current applications it is necessary to increase charge lifetime. To improve the local vacuum condition around the cathode the use of a cryogenic sub-volume is proposed. It is expected that the cryogenic adsorption of reactive residual-gas molecules yield an enhanced lifetime of the negative-electron-affinity surface of the cathode. Additional cooling of the cathode itself allows a higher laser power to be deposited in the material, resulting in higher possible beam currents. Implementation and first measurements are planned to be conducted at the TU-Darmstadt Photo-CATCH test set-up to investigate the operational parameters of the new source. Supported in parts by BMBF (05H18RDRB1) and by DFG (RTG 2128 “Accelence”).

Summary

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