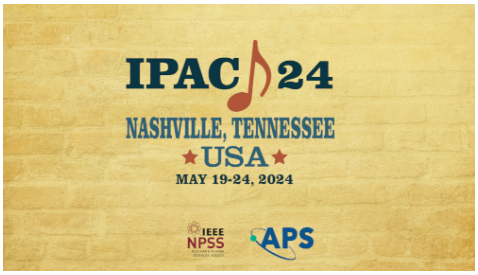

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Towards operating low mean transverse energy alkali antimonide photocathodes at Argonne Cathode Test-stand

Wednesday, 22 May 2024 16:00 (2 hours)

The performance and scientific reach of advanced electron accelerator applications, such as particle colliders, x-ray free electron lasers, and ultrafast electron diffraction, are determined by beam brightness. The beam brightness is constrained by the quality of photocathodes and is associated with low Mean Transverse Energy (MTE) of photoemitted electrons. To meet the requirements for applications demanding a bright electron beam, photocathodes must exhibit ultrasmooth physical and chemical roughness, a long operational lifetime, and robustness under high applied electric fields and laser fluences. In this work, we present the development of an experimental setup for the growth and in-situ characterization of high-quality, low-MTE alkali antimonide photocathodes. Additionally, we describe the modifications made to the Argonne Cathode Test-stand (ACT) at the Argonne Wakefield Accelerator (AWA) Facility, necessary for studying the performance of alkali antimonide photocathodes under real photoinjector conditions.

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