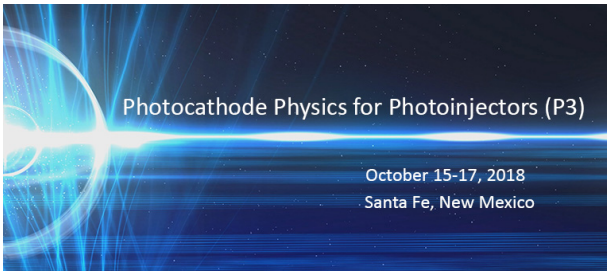

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Measurements of physical and chemical roughness of alkali-antimonides

Tuesday 16 October 2018 11:55 (20 minutes)

Alkali antimonide photocathodes have attractive properties, such as low-emittance and high quantum efficiency, which makes them excellent candidates for high-brightness electron sources. Less attractively, these materials are highly reactive and require ultra-high vacuum conditions to prevent irreversible oxidation, which precludes ex-situ characterization. Such limitations have stymied a complete understanding of the effects of chemical and morphological heterogeneity on performance. In this talk, I will discuss recent research in the Center for Bright Beams, a NSF-funded Science and Technology Center (STC), on the growth, transfer, and surface characterization of highly reactive cesium antimonide photocathodes in vacuo. The chemical heterogeneity of the photocathodes was studied using x-ray photoemission spectroscopy (XPS), which showed that the near-surface composition is a mixture of stoichiometric cesium antimonide and metallic antimony with a cesium-rich surface layer. Scanning tunneling microscopy (STM) shows rough surfaces with atomic height steps in some domains. On-going efforts to measure spatially-resolved quantum efficiency using a coaxial STM tip will be discussed.

Presenter: Mr DEBENEDETTI, William (Cornell University)

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