**Development of Multi-alkali antimonides photocathodes  
 for high brightness photoinjectors**

S.K. Mohanty†,¹, M. Krasilnikov , A. Oppelt, F. Stephan, DESY Zeuthen, Germany

D. Sertore†, L. Monaco, Istituto Nazionale di Fisica Nucleare - LASA, Segrate, Italy

C. Pagani, ,Università degli Studi di Milano & INFN, Segrate, Italy

W.Hillert, University Of Hamburg, Germany

¹also at INFN-LASA, Segrate, Italy

Multi-alkali antimonide photocathodes can have high quantum efficiency similar to UV-sensitive (Cs₂Te) photocathodes but with the advantages of photoemission sensitivity in the green wavelength and a significant reduction in the mean transverse energy of photoelectrons. In order to optimize and better understand the photo emissive film properties of K-Cs-Sb photocathodes, two photocathodes with different thicknesses were grown on molybdenum substrates via a sequential deposition method in a new preparation system at INFN LASA. During the deposition, a "multi-wavelengths" diagnostic, i.e., the measurements of the real-time photocurrent and reflectivity at different wavelengths (in the range from 254 nm – 690 nm), has been applied during the growth. Optical spectra of these semiconductors provide a rich source of information on their electronic properties. This new information, together with past results obtained with our standard diagnostic tools, will help to improve the understanding of the growing process of these photocathodes. In addition, in the framework of density functional theory (DFT), we investigated the electronic and optical properties of K₂CsSb and K₃Sb materials. This allowed us to establish a correlation between the calculated and measured optical properties, such as reflectivity, which gives a valuable addition to further understanding the photoemissive material's properties. In this talk, we present and discuss the experimental results obtained from the two different thickness K-Cs-Sb photocathodes, along with the DFT results of K₃Sb, and K₂CsSb materials.