ACCELERATOR SEMINAR

"Sources of Emittance in Photocathode Injectors: Intrinsic emittance, space charge forces due to non-uniform emission, RF and solenoid aberrations"

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Advances in electron beam technology have been central to creating the current generation of x-ray free electron lasers a reality for basic research and applied science. One important beam technology is the electron source which, for many of these facilities, is the photocathode RF injector. Major advances include the invention of the RF gun itself as well as the developments of emittance compensation and beam matching in the presence of space charge and RF forces. Achieving even brighter beams requires taking a finer resolution view of the electron dynamics near the cathode during photoemission and the initial acceleration of the beam. As a consequence of its quality, the bright beam is more sensitive to degradation by the optical aberrations of the gun's RF and magnetic lenses. This talk discusses these topics including the beam properties due to fundamental photoemission physics, space charge effects close to the cathode, and optical distortions introduced by the RF and solenoid fields. Analytic relations for these phenomena are derived and compared with numerical simulations. Potential techniques for mitigating these emittances are discussed.

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Thursday, October 20, 2016
11:00 a.m.
CEBAF Center, Room F113

Coffee before seminar beginning at 10:45 a.m.

Jefferson Lab

For further info, please contact Carlos Hernandez-Garcia at ext. 6862