

PROGRESS ON EXPERIMENTAL STUDY OF BEAM ENERGY SPREAD IN THE SPACE-CHARGE DOMINATED BEAMS*

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Many applications with intense charged particle beams, such as the ion drivers for Heavy Ion Fusion (HIF), require a small beam energy spread. It is believed that coupling between transverse and longitudinal direction due to coulomb collisions, instabilities and other mechanisms will cause an increase of the beam longitudinal energy spread. Characterization of beam energy spread is very important to understanding the physics of beam energy spread growth in the intense beams. So far, little experiments have investigated this problem in a systematic way. Low-energy, intense electron beams provide an economic way to study this problem in a small-scaled experimental setup. The results obtained with low-energy electron beams can be scaled to high-energy ion beams with appropriate scaling. At the University of Maryland, experiments with space-charge-dominated electron beams are being carried out to study the energy evolution in such beams. In order to measure the energy spread, a high-resolution retarding field energy analyzer has been developed and tested. A one-meter long linear system with solenoidal focusing is being set up and commissioned. In this paper, some preliminary experimental results and progresses on this topic will be presented.

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