STUDY OF THE ELECTRON BEAM DYNAMICS IN THE FERMI @ ELETTRA LINAC

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A study of the electron beam dynamics in the linac is made within the framework of the design of a free electron laser (FEL) at the Synchrotrone Trieste [1]. A scope of the work includes analysis of two operational scenarios, one with relatively long electron bunches of the order of 1.5 ps and a moderate peak current of 500 A and one with shorter bunches of the order of 0.7 ps and higher peak current of the order of 800 A. In both cases, care has been taken to preserve the slice and projected emittances formed in the photocathode gun injector and to minimize the slice energy spread. The latter goal is accomplished by balancing the onset of the microbunching instability driven by the longitudinal space charge forces and the emission of coherent synchrotron radiation using Landau damping produced by a so-called laser heater. Various analytical techniques and tracking codes have been employed to obtain the reported results.

[1] C. Bocchetta *et al.*, "FERMI@Elettra – Conceptual Design for a Seeded Harmonic Cascade FEL for EUV and Soft X-rays", this conference.

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