Low Energy Electron Beam as Non-Destructive Beam Diagnostic Tool for High Luminosity Linear and Circular Colliders

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Abstract

This paper presents the current progress in developing of non-destructive method for intensive relativistic bunch diagnostic. The method is based on the scanning of the thin electron electron beam within the energy range 20-100 kV in the electromagnetic fields of an intensive relativistic bunch. We used to inject the probe beam across the path of relativistic bunch. This type of an electron beam probe is suitable for both circular and linear accelerators. The results obtained on the VEPP-3 storage ring and on the electron linac of VEPP-5 injector complex at BINP have found out some new features of this non-destructive single bunch diagnostic tool. It is able to investigate not only the longitudinal charge distribution in the bunch, but also the transverse one. It is also sensitive to the transverse motion inside the bunch and, it can even feel wake-fields after the bunch. This diagnostic can be fruitful for future high luminosity linear and circular colliders.