A SHIELDED PICK-UP DETECTOR FOR ELECTRON CLOUD MEASUREMENTS IN THE CESR-TA RING



SUMMARY

The experimental study of the electron cloud dynamics and mitigation techniques is one of the main objectives of the CESR Damping Ring Test Accelerator (Cesr-TA) program. Shielded pick-up buttons are a relatively simple diagnostic device for obtaining time-resolved information on the electron cloud density. They have been already successfully employed on the SPS at CERN, although with different resolution parameters due to the different type of beams. We present the initial results obtained using such a detector in the Cesr-TA electron/ positron ring. By carefully designing the read-out electronics we were able to resolve the individual bunch contribution to the electron cloud formation process along a bunch train and gain useful information on its decay time. Alternatively, by increasing the electronics integration time, we could use our device as a sensitive detector of the average electron cloud density level generated by the passage of a bunch train.

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J. SIKORA, Y. LI, M. PALMER – CLASSE, ITHACA, NEW YORK J. BYRD, S. DE SANTIS, D. MUNSON - LBNL, BERKELEY, CALIFORNIA



PRINCIPLES OF THE TECHNIQUE

ELECTRODE COLLECTS LOW-ENERGY ELECTRONS. PICKUP CURRENT IS PROPORTIONAL TO THE ELECTRON CLOUD DENSITY. • GRILLE SHIELDS FROM BEAM WAKEFIELD. DIRECT BEAM SIGNAL ALSO HAS VERY DIFFERENT TEMPORAL PROPERTIES.

• BIASING VOLTAGE REGULATES THE AMOUNTS OF ELECTRONS COLLECTED. CAN BE USED FOR A ROUGH SELECTION OF ENERGY RANGES.

ECD (LINEAR DENSITY)

EXPERIMENTAL RESULTS





TUPSM072



PICKUP CURRENT

GEOMETRIC FACTOR