A Hilbert Transform Spectrometer using a High Tc Josephson Junction for Bunch Length Measurements at the TTF Linac, M. GEITZ, K. HANKE**, P. SCHMUESER***, DESY; Y. DIVIN****, U. POPPE, IFF, KFA-JUELICH; V. PAVLOVSKII, V. SHIROTOV, O. VOLKOV, IRE MOSCOW; M. TONUTTI, 3. PHYS. INST. RWTH AACHEN - The longitudinal charge distribution of an electron/positron bunch can be determined from the coherent transition radiation emitted as the bunch crosses a thin metal foil. A Josephson junction made from Yba$_2$Cu$_3$O$_{7-x}$ is used for a detector for transition radiation in the millimeter and submillimeter range. The radiation-induced modification of the current-voltage characteristic of the Josephson junction is derived from a scan with and without incident radiation. Multiplying this quantity with the dc bias current and the dc voltage across the junction and applying a Hilbert transformation one obtains the spectral intensity of the radiation and the longitudinal form factor of the bunch. The physical principles of a Josephson junction as a detector for submillimeter wave radiation are outlined and a first bunch length measurement is presented.

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