

## **Design of a 3rd Harmonic Superconducting Cavity for Bunch Lengthening in ELETTRA,**

A. FABRIS, C. PASOTTI, P. PITTANA,  
M. SVANDRLIK, Sincrotrone Trieste;

D. CASTRONOVO, Univ. di Trieste - The beam lifetime in the 2 GeV low emittance storage ring ELETTRA is dominated by the Touschek effect. The present method of increasing the lifetime is to operate with a controlled amount of longitudinal coupled bunch instability, which also helps to stabilize the beam against transverse modes. In the future, with the foreseen elimination of both longitudinal and transverse modes, there is the requirement for a new solution to increase lifetime, which is a fundamental issue in ELETTRA since the energy is ramped from 1.0 to 2.0 GeV in the storage ring. A 3rd harmonic cavity, operating at 1.5 GHz, can increase the bunch length, and correspondingly the lifetime, by a factor 3 to 4. To achieve this result a idle, superconducting cavity seems the most attractive solution, since it can provide the required voltage at a reasonable field gradient (6.0 MV/m) with negligible beam energy loss, which can be easily restored by the normal conducting RF system. Furthermore the cavity can be designed in such a way as to almost eliminate the effects of its own Higher Order Mode spectrum. In this report we present the electromagnetic design of the cavity and the status of the engineering design.