

Limits to Shortening Bunch Lengths by Reducing Momentum Compaction Factors in Electron or Positron Storage Rings, K. SOUTOME, M. TAKAO, H. TANAKA, SPRING-8; Y. SHOUJI, LASTI - We propose a simple method to estimate the limit to shortening the equilibrium bunch length by reducing momentum compaction factors in electron/positron storage rings. When the momentum compaction factor is reduced to a small value in order to achieve a very short bunch length, fluctuations of path lengths due to the emission of photons can no longer be ignored and this effect determines the limit of equilibrium bunch lengths at low beam currents. Analytical expressions for this limit of bunch lengths are formulated using lattice parameters of the storage rings. Some numerical examples are presented.