

Generation of High-Energy Synchrotron Radiation with a 10T Superconducting Wiggler Installed in the SPring-8 Storage Ring

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Abstract

In August, 2002 we installed a 10T superconducting wiggler in the 8GeV electron storage ring at SPring-8, tested its performance and investigated the effect on a stored beam. A beam was successfully stored in the storage ring at magnetic fields of the wiggler up to 9.7 T. The stored current was limited to 1 mA to avoid damage to accelerator components from high heat-load and to maintain radiation safety. A beam size, a bunch length and a tune shift affected by the strong magnetic fields were measured and sufficiently agreed with values deduced from data of the magnetic field measurement of the wiggler. We also measured a spectrum of high-energy synchrotron radiation from the wiggler with an NaI scintillator at an extremely low beam current less than 10pA. High-energy gamma rays in MeV-region could be detected and were compared with calculations taking account of the geometrical conditions of collimation and shields around the detector. There is various and useful application of the high-energy gamma rays radiating from the wiggler such as creation of an intense low-energy positron beam. It can be used as probes of the Fermi surface and defects of sub-nano scale.

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