

The LHC 450 GeV to 7 TeV Synchrotron Radiation Profile Monitor Using a Superconducting Undulator

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Abstract

In LHC it will be important to measure in a non-destructive way and with a good precision the proton beam profiles from 450 GeV to 7 TeV. The chosen monitor will make use of a 5 T superconducting Undulator with two periods coupled to the D3 bending magnet built by BNL. From the various cases studied, this combination is the only one, which could cover the whole LHC energy range. By locating both magnets in same cryostat, it was possible to minimize the light source length for best precision. The choice of the undulator parameters and its basic design will be described. The evolution of the synchrotron radiation patterns along the beam ramp will be given, as well as the optics of the telescope and its performance with respect to depth of field, diffraction and sensitivity. The expected performance, down to single turn and bunch-by-bunch, will be given, together with a description of the design and simulation codes used.