

Study of Different Operating Modes of the 4th RF Harmonic Landau Damping System in the CERN SPS,

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E. SHAPOSHNIKOVA, CERN - The SPS accelerator will be used as the injector for the Large Hadron Collider (LHC) at present being constructed at CERN. At extraction to the LHC, 450 GeV, the longitudinal emittance of the bunches should be below 0.7 eVs, an increase of only 0.2 eVs from the injection value. One area of concern in maintaining this tight budget is due to multi-bunch instabilities, which are already observed on the fixed target physics beam. This beam has a total intensity similar to the LHC beam but a much lower bunch intensity (by one order of magnitude). At the end of the acceleration cycle, 450 GeV, the emittance of this beam is six times that at injection and exceeds by almost a factor of two the value required for LHC. To study possible cures for this instability we used a fourth harmonic RF system already installed in the SPS in bunch lengthening and bunch shortening modes of operation. The latter mode was found to be more efficient in controlling beam stability. The results of these studies are presented together with measurements of beam transfer functions in a double RF system.