

Machine development time request

Contact person

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Machine

SPS (chosen from the menu of the webpage)

General subject

LHC beam (chosen from the menu of the webpage)

Subject of the experiment

Long-range beam-beam studies for the LHC using the SPS wires for excitation and compensation experiments.

Motivations of the experiment

During the 2009, we reproduced in the MDs dedicated to the long-range beam-beam studies, the equivalent long-range beam-beam excitation of one LHC interaction region at LHC nominal current. In the excitation experiment, we observed a significant reduction of the beam lifetime while, in the compensation experiment, we almost recovered the beam lifetime of the unperturbed machine. Due to the longer observation period, it appeared evident that the experiments performed with a beam in coast carry more information than similar experiments done in pulsed mode. Nevertheless, due to lack of time only the nominal LHC tunes were explored (with coasting beam). We think it is worth to investigate with a similar approach several working points to observe in the different conditions the steady state losses of the beam in excitation and compensation mode.

Other participants

Jean-Pierre Koutchouk, [Rama Calaga?](#) [Guido Sterbini?](#), [Emanuele Laface?](#)

Beam conditions

It is important to have a coasting beam. The momentum can range between 55 and 120 GeV/c (**the lower the better if the beam lifetime of the unperturbed machine is good, i.e., >1 h?, ideally one MD at 55 GeV/c and another at 120 GeV/c**). At 50 GeV/c it is possible to reach the 9.5 sigma separation using a convenient orbit bump ($\epsilon_{nx} = \epsilon_{ny} = 1.5 \text{ um rad}$). At 120 GeV/c, in addition to the bump, an emittance blow-up is required ($\epsilon_{nx} = \epsilon_{ny} = 8 \text{ um rad}$). The beam structure required is 4 bunches with $\sim 5 \cdot 10^{11}$ ppb.

