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Bunch-by-bunch feedback system used as a diagnostic tool for multi-bunch beams in the DAFNE collider

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DAFNE is an electron-positron collider in operation at INFN-LNF since 2001. Bunch-by-bunch feedback systems installed in each of the two rings allow to store high-intensity and stable beams, by counteracting coupled-bunch instabilities. The feedback systems can be also used as a diagnostic tool able to measure beam parameters which are significant for the evaluation of the instabilities. In this paper, we first describe the acquisition system used to collect the beam data provided by the feedback systems. Then we report recent transverse tune shift and grow-damp measurements with positron beams, performed using the feedback as a diagnostic tool. These measurements helped to characterize the electron-cloud beam instability, which is one of the main factors currently limiting the DAFNE performance. Finally, we describe the first measurements and feedback system setup designed to automatically record turn-by-turn bunch position displacements when a sudden loss in beam current occurs due to any faults in the collider. This tool can be very useful in identifying the causes of these events and performing beam dynamics studies and code validation.

Footnotes

Funding Agency

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Yes

Primary author: QUARTULLO, Danilo (Istituto Nazionale di Fisica Nucleare)

Co-authors: D'UFFIZI, Alessandro (Istituto Nazionale di Fisica Nucleare); STELLA, Angelo (Istituto Nazionale di Fisica Nucleare); DE SANTIS, Antonio (Istituto Nazionale di Fisica Nucleare); MILARDI, Catia (Istituto Nazionale di Fisica Nucleare); PELLEGRINI, Donato (Istituto Nazionale di Fisica Nucleare); GRILLI, Gianluca (Istituto Nazionale di Fisica Nucleare); FRANZINI, Giovanni (Istituto Nazionale di Fisica Nucleare); Dr ZOBOV, Mikhail (Istituto Nazionale di Fisica Nucleare); ETISKEN, Ozgur (Kirikkale University); OZDEMIR, Senem (Ege University); SPAMPINATI, Simone (Istituto Nazionale di Fisica Nucleare); DE NARDIS, Thomas (Istituto Nazionale di Fisica Nucleare)

Presenter: QUARTULLO, Danilo (Istituto Nazionale di Fisica Nucleare)

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