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STATUS AND RELAIBILITY ENHANCEMENTS OF THE ALBA LINAC

D. Lanaia, R. Muñoz Horta, F. Pérez

Abstract

The pre-injector of the ALBA Synchrotron is a Linac that delivers 110 MeV electrons during regular operation. It consists in two Pre-bunchers, a Buncher and two Accelerating Sections fed by two pulsed 37 MW klystrons. Along the years, efforts to enhance the ALBA Linac performance and reliability have been devoted, resulting in an improvement of the Linac to Booster beam transmission efficiency, and of its Mean Time Between Failures (MTBF). The performance enhancement has been based on the use of optimization and control routines of the beam parameters (such as beam position and energy), but also by the application of regular preventive hardware maintenance procedures. Besides, the Linac reliability has been improved also by the implementation of alternative working modes in case of hardware failures, like operating at 67 MeV, with only one klystron and one Accelerating Section. In this respect, a new upgrade of the RF waveguide system is being implemented, with the aim to produce 80 MeV electron beam using only one klystron that will feed both Accelerating Sections. At this energy the injection to the Booster is expected to be more stable than with the existing 67 MeV mode. Furthermore, the possibility to install a thermionic RF-gun to inject directly into the first Accelerating Section is under study. This new gun will be installed in addition to the existing system, and will allow handling in short time any failure either from the DC-gun, the Pre-bunchers or the Buncher, ensuring the Linac's reliability even in case of a major event. Details of the Linac performance during the past years and a description of the new hardware upgrades are presented in this work.

Accelerator Division
Alba Synchrotron Light Source
c/ de la Llum, 2-26
08290 Cerdanyola del Valles, Spain