CERN's latest LS2 Report: Beams circulate in the PS Booster

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A view of the PS Booster after its metamorphosis. Credit: CERN

If you follow CERN on social media, you probably saw back in December that the first beam had been injected into the PS Booster (PSB), thus connecting the machine for the first time to the new Linac4.

This is a crucial milestone for the LHC Injectors Upgrade (LIU) project

and an extraordinary accomplishment for all the teams involved in the PSB metamorphosis. "We changed almost everything in the Booster during LS2; it is basically a new accelerator that we turned on at the beginning of December. It was a remarkable achievement and a testament to the excellent preparatory work done by all equipment groups to see that practically everything was working as expected," says Bettina Mikulec, who leads the operations team for the PS Booster and Linac4.

But the commissioning of the booster is not as easy as turning on a TV. It is a lengthy and ongoing process. "In December, the brand-new state-of-the-art injection system was commissioned progressively and low-intensity beams were first guided to the very entrance of the accelerator, then injected into each one of the booster's four rings," explains Gian Piero Di Giovanni, LIU project leader for the PS Booster. "We managed to have beam circulating systematically for several hundred milliseconds, which is already a great success."

The PS Booster is made up of four superposed synchrotron rings that are fed by Linac4. Depending on the beam schemes "requested" by the accelerators downstream, only some or all of the four rings receive beams.

Still, many settings have to be refined, and the operators must take ownership of their new machine. "The theoretical model developed for the upgraded booster now gives a better description of the machine. This allows us to be precise in our tuning, and to get the most out of the accelerator," adds Mikulec.

The booster currently receives beams from Linac4 at the energy of 160 MeV; its job is to accelerate them up to 2 GeV. "The booster's new radiofrequency acceleration system is currently being commissioned. Once this crucial step is completed, we will be able to accelerate protons

in the machine," says Di Giovanni. This should happen in the coming weeks. In March, the first beams will then be extracted from the Booster into the PS. But that is another story.

Provided by CERN