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## **Measurement and Alignment of the TIDVG5 SPS Beam Dump**

During the long shutdown for maintenance and upgrade, (LS2 2018-2021) the CERN injector complex received an important update to meet the future HL-LHC requirements.

One major project was the construction and installation of a new beam dump in the Super Proton Synchrotron (SPS), able to cope with the increasing brightness of the High-Luminosity beams. The challenge for survey engineers was to align the beam dump and especially the core of the component within the precision required by the physicists.

The measuring system had to ensure an alignment precision of  $\pm 0.7$  mm with respect to the beam axis defined by surrounding quadrupoles, while facing many external constraints. A 2 m thick wall composed of steel, concrete and marble, shields the new beam dump. The estimated dose for a year of operation is 1 MGy at 35 cm from the core. In addition, a bakeout of the dump up to 150°C is required to ensure the needed vacuum quality. The system had to be reliable and failsafe as there is no manual access for the 20 years of service possible. These heavy constraints led to a complete study of the spatial measurement system of the equipment.

The paper describes in detail the design of the measurement and alignment system from the initial idea to the prototypes and the production. It also provides an overview of the tests and the first measurement results achieved with this system.

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