

How to Control the Proton Beam on the SINQ Target

In 2019, we have introduced a new system that improves the safe application of the proton beam onto the SINQ target. The basic idea is that we detect the beam position directly in the target with a two-dimensional network of temperature sensors. The temperature measurement is done with type-K thermocouples directly in our Zircaloy target rods. This system is called TBPS (Target Beam Positioning System) and is installed in every new target since then. The TBPS helps to protect our target from overheating and is therefore relevant for a fast beam shut-off.

The system was used for the first time in target #14 and is, with a minor improvement, currently running successfully in target #15.

The poster will present technical details about the temperature sensors themselves, their locations and how they were installed. In addition, the algorithms are explained which are used to create the Gaussian three-dimensional temperature distribution plots as well as the way how they are visualized on the beam control monitors in real time. The analysis and visualization are done by a program in LabVIEW that creates a 3D temperature map (X, Y, T) from the temperature values of the TBPS grid. This gives the proton beam operators very useful information about the position and the width of the beam inside the target.

Additionally, the temperatures are compared with the calculated values from CFD-simulations. The calculations give a good agreement.

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