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Cooling and thermomechanical studies for the IMPACT HIMB collimator system

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The demand for muon facilities has been continuously increasing since surface muons play a significant role in particle and solid-state physics. The installation of a refurbished muon target station and two new High-Intensity Muon Beam lines (HIMB) in the framework of the Isotope and Muon Production using Advanced Cyclotron and Target technology project (IMPACT) at PSI will pave the way to unprecedented muon intensities allowing, among others, next generation lepton flavor violation experiments.

In this context, a new collimation system composed of three collimators made of oxygen free copper has been designed in order to reduce the divergence of the proton beam due to multiple scattering in the new target. The thermomechanical integrity of each collimator has to be investigated also in the prospect of an increased proton beam current up to 3 mA. The cooling of the collimator system is provided by water flowing in a system of eight helicoidal stainless steel pipes brazed to the main copper bodies. Steady-state computational fluid dynamics simulations and tailored semi-analytical models in the ANSYS software package have been used to provide the optimal design of the collimator system.

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Footnotes

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Yes

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