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The High intensity Muon Beam (HiMB) project at PSI: Status and Results with the new installed production target

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Meson factories are powerful drivers of diverse physics programs and play a major role in particle physics at the intensity frontiers.

Currently PSI delivers the most intense continuous muon beam in the world up to few 10E8 μ+/s. The High Intensity Muon Beam (HiMB) project at PSI aims at developing new muon beam lines able to deliver up to 10E10 μ+/s, with a huge impact for low energy muon based searches.

While next generation of proton drivers with beam powers in excess of the current limit of 1.4 MW still requires significant research, the focus of HiMB is the optimisation of existing target stations and beam lines. Detailed Monte Carlo simulations show that geometrical target optimisations would imply beam intensity gains in the range of 30-60%, that could be further increased by using novel target materials such as boron carbide. Higher muon capture and transmission beam line efficiencies can be obtained with the design of a beam line optics based on pure solenoid elements. The expectation is an increased of the total fraction of captured and transmitted muons by more than one order of magnitude with respect to the current hybrid beam lines.

During the 2019 a new production target, the so called target E*, has been installed and tested along the primary beam line at PSI, proving that the expected increase of muon yield associated with the new target can be achieved, consistently with the Monte Carlo simulation prediction. Putting into perspective the target optimisation only it would correspond to effectively raising the proton beam power at PSI by 650 kW, equivalent to a proton beam power of almost 2 MW without additional complications such an increased energy and radiation deposition into the target and its surroundings.

In this talk the most recent results about the new target installation and the status of the project will be reported in detail.

Secondary track (number)

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