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The High Intensity Muon Beam (HiMB) project at PSI

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

Currently PSI delivers the most intense continuous muon beam in the world up to 5 x 10ˆ8 μ+/s. The High Intensity Muon Beam (HiMB) project at PSI aims at develop new muon beam lines able to provide up to 10ˆ10 μ+/s. 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 a design of a beam line optics based on pure solenoid elements. The expectation is to increase the total fraction of captured and transmitted muons by more than one order of magnitude with respect to the current hybrid beam lines.

Putting into perspective the target optimisation only, corresponding to O(50%) of muon beam intensity gain, would corresponds 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.
Taking also into account the beam line optimisation the equivalent proton beam power would be of order of several tens of MW, an outstanding value and out of present technological capabilities.

This year the new production target prototype will be installed and tested along the primary beam line at PSI. The status of the project will be reported in detail.

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