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Particle and Nuclear Physics at PSI

CHRISP is the Swiss Research Infrastructure for Particle Physics at PSI. The High Intensity Proton Accelerator complex HIPA provides a beam of 590 MeV protons at 50 MHz from its ring cyclotron to targets. The beam with an average current of up to 2.4 mA, corresponding to 1.4 MW average beam power, simultaneously serves nuclear and particle physics experiments with pions, muons and ultracold neutrons (UCN), as well as two other large communities for materials research with muons at the Swiss muon Source, S μ S, and neutrons at the Swiss spallation source, SINQ, respectively. The pion, muon and UCN beams are some of the highest intensity, low momentum beams available worldwide offering unique opportunities, see [1] for the latest review. In addition, particle beams are also used for test purposes, for detector development or radiation hardness. Within CHRISP and using a beam of up to 230 MeV from the medical cyclotron COMET, the proton irradiation facility PIF serves a large community from industry, universities, CERN and ESA.

The experiments carried out in nuclear and particle physics cover a broad range of questions from fundamental symmetry tests, e.g. regarding charged lepton flavor, lepton universality and CP violation, to precision measurements of parameters and benchmarks of the Standard Model of particle physics and modern nuclear theory, such as particle masses or nuclear charge radii. The talk will present an overview of the ongoing efforts and discuss the planned upgrade of the facility to even higher intensity muon beams.

[1] A. Signer, K. Kirch, C.M. Hoffman, Review of Particle Physics at PSI, SciPost Phys. Proc. 5 (2021), doi:10.21468/SciPostPhysProc.5

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