

The HyperMu experiment: measuring the Zemach radius of the proton

The HyperMu experiment is planning to measure the hyperfine splitting of the muonic hydrogen 1S level to extract the Zemach radius of the proton. A DC muon beam will be stopped in a cryogenic hydrogen target placed inside a laser cavity. After thermalisation and de-excitation, on resonance a powerful 6.8 μm laser pulse triggered by the incoming muon will excite the muonic atom to the 1S(F=1) level. The subsequent de-excitation provides enough kinetic energy for the atom to diffuse to the target wall, which is coated with a thin gold layer. The muon quickly transfers to a gold atom, the high energy X-rays from the muonic gold cascade are detected as the resonance signal.

Last fall, a first test measurement with the detector system was performed at the Paul Scherrer Institute, providing valuable input for the final design of the apparatus. This year, the laser system is being further developed

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