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The proton radius can be determined by measuring the slope of the electric form factor G_E at small squared four-momentum transfer Q^2 . Numerous elastic scattering and laser spectroscopy measurements of the proton radius have been performed with contradicting results –the so-called proton radius puzzle. We propose to measure the proton radius in high-energy elastic muon-proton scattering at the M2 beam line of CERN's Super Proton Synchrotron in the year 2023. A high-precision measurement at low Q^2 realized with a high-pressure hydrogen TPC can contribute to a solution of the puzzle, especially in view of the systematics of this approach compared to electron scattering.

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