Spectroscopy of muonic atoms

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In the past years we have measured several 2S-2P transitions in muonic hydrogen (μp), muonic deuterium (μd) and muonic helium ions (μ^3He, μ^4He). From this measurements we deduced the corresponding nuclear charge radii.

From muonic hydrogen we extracted a proton charge radius 20 times more precise than obtained from electron-proton scattering and hydrogen high-precision laser spectroscopy but at a variance of 7σ from these values. This discrepancy is nowadays referred to as the “proton radius puzzle”. The status of the proton charge radius puzzle including the new insights obtained by μD and μHe spectroscopy will be discussed.

Moreover we will sketch some new ideas we are pursuing at PSI related with spectroscopy of Muonium and the measurement of its gravitational interaction.