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Precision spectroscopy of the 2S-6P transition in atomic hydrogen LOTHAR MAISENBACHER, VITALY WIRTHL, ARTHUR MATVEEV, ALEXEY GRININ, Max Planck Institute of Quantum Optics (MPQ), RANDOLF POHL, Johannes Gutenberg University Mainz, THEODOR W. HÄNSCH, MPQ; Ludwig Maximilian University of Munich, THOMAS UDEM, MPQ — Precision measurements of atomic hydrogen (H) have long been successfully used to extract fundamental constants and to test bound-state quantum electrodynamics. Both the Rydberg constant R_∞ and the proton root mean square charge radius r_p can be determined by H spectroscopy with high precision. We have previously measured the 2S-4P transition frequency to 4 parts in 10^{12} (A. Beyer et al., Science 358, 79 (2017)), finding good agreement in r_p with the spectroscopy of muonic H (A. Antognini et al., Science 339, 417 (2013)). Recently, we have completed data-taking on the 2S-6P transition in H, which has a three times lower linewidth compared to the 2S-4P transition. This factor, together with an upgraded fluorescence detection, allows for a five-fold improvement in fractional precision. Here, we will discuss the ongoing data analysis and present preliminary results, focusing on a frequency shift from the light forces acting on the atoms.

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