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Quantum Electrodynamics of the hydrogen molecule

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In 1947 Hans Bethe² explained apparent discrepancy between Dirac theory for the hydrogen atom and the measurement of the $2S_{1/2} - 2P_{1/2}$ transition by W. Lamb and R. Retherford. His explanation set the grounds for the development of the quantum electrodynamic theory (QED) by S. Tomonaga, J. Schwinger, R. Feynman and F. Dyson. Inspired by this original work of Bethe, we search for discrepancies between highly accurate spectroscopic measurements for the hydrogen molecule³ and theoretical predictions^{4 5} based on QED, in order to discover new effects or even new interactions which might result in the development of Standard Model of fundamental interactions.

¹session: Advances in spectroscopy of the hydrogen molecule, its isotopologues, and its ion.

²H. Bethe, Phys. Rev. **72**, 339 (1947)

³N. Hölsch *et al.*, Phys. Rev. Lett. *in print*, (2019)

⁴M. Puchalski, J. Komasa, and K. Pachucki, Phys. Rev. Lett. **120**, 083001 (2018)

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