

Improved determination of the dissociation energy of H₂

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The dissociation energy (D_0) of H₂ is a benchmark value in quantum chemistry, with recent QED calculations now approaching accuracies achievable in simple atoms. Precise measurement of the *GK-X* molecular transition, in combination with other precision measurements, provides a determination of D_0 . The *GK-X* transition is excited through Doppler-free two-photon spectroscopy using 179-nm radiation, based on frequency up-conversion using a special KBBF crystal. The optical frequency of the fundamental (716 nm), which is the output of a narrowband pulsed Ti:Sa laser system, is locked to a frequency comb. This enables accuracies of the *GK-X* transition to a few parts in 10¹⁰ or MHz level, leading to an order-of-magnitude improvement for D_0 . The comparison of this accurate experimental result with the best calculations may provide a test of the Standard Model of Physics.