Two-photon spectroscopy of H_2^+

Julian Schmidt[1], Thomas Louvradoux[1], Mohammad Haidar[1], Johannes Heinrich[1], Jean-Philippe Karr[1,2], Laurent Hilico[1,2]

[1] *Laboratoire Kastler Brossel (SU, CNRS, ENS, Collège de France)*

[2] *Université d'Evry – Val d'Essonne*

International Conference on Precision Physics and Fundamental Physical Constants (FFK-2019)
Tihany, 12 June 2019

What ? What for ?

Aim: measure the (v=0,L=2) → (v=1,L=2) Doppler-free two-photon transition at λ = 9.166 µm with ~10^{-12} accuracy

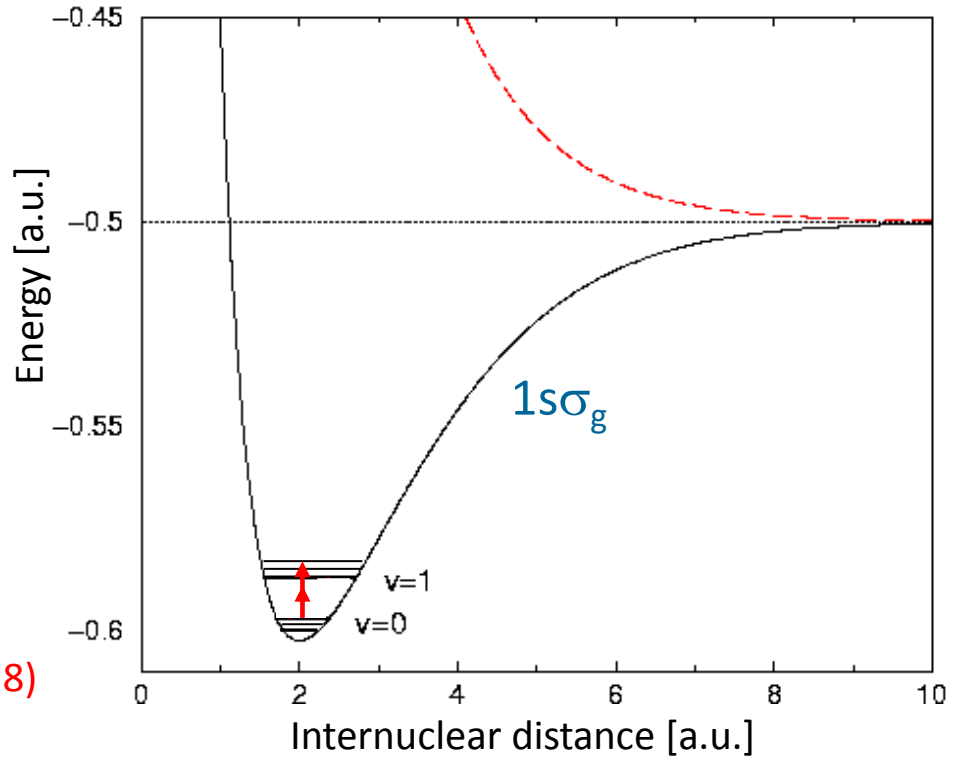
Predicted transition frequency:

ν = 65 413 215 616.1 (5) (20) kHz

Theoretical uncertainty = **7.5 10^{-12}**

Uncertainty from m_p/m_e (CODATA 2018)

V.I. Korobov, L. Hilico, J.-Ph. Karr, PRL 2017



✓ Allows determination of m_p/m_e to 1.5 10^{-11}

➢ Why is it useful to have measurements in both HD^+ and H_2^+ ?

Different dependences on F. C.:

H_2^+	R_∞	r_p	m_e/m_p
HD^+	R_∞	$r_p^2 + r_d^2$	$m_e/m_r^{(pd)}$

Experimental setup