Contribution ID: **27** Type: **not specified**

Two-photon spectroscopy of H2+

Wednesday 12 June 2019 14:05 (5 minutes)

The molecular hydrogen ion H2+ is a promising candidate for fundamental metrology. Measuring one or several rovibrational transition frequencies at the few-10-12 accuracy level would provide an independent measurement of the proton-to-electron mass ratio mp/me and may shed light on the proton radius puzzle [1]. This poster will report on recent progress towards this goal. We aim at measuring the (v=0,L=2) -> (v'=1,L' =2) transition Doppler-free two-photon transition at lambda = 9.17 μm. H2+ ions are stored in a linear ion trap and sympathetically cooled by laser-cooled Be+ ions. Experimental results of state-selective preparation of H2+ ions in the v=0 and v=1 states and a demonstration of our detection mechanism via photodissociation will be presented.

[1] J.-Ph. Karr, L. Hilico, J.C.J. Koelemeij, V.I. Korobov, Phys. Rev. A 94, 050501(R) (2016).

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Session Classification: Poster session