Sensitivity of microwave spectra of molecules to variation of electron-to-proton mass ratio

MIKHAIL KOZLOV, Petersburg Nuclear Physics Institute, Russia, ALEXANDER LAPINOV, Institute of Applied Physics, Russia, SERGEY LEVSHAKOV, Ioffe Physical-Technical Institute, Russia — We estimate sensitivity coefficients $Q_\mu$ to variation of the electron-to-proton mass ratio $\mu = m_e/m_p$ for microwave transitions in partly deuterated ammonia and for $\Lambda$-doublet transitions in light diatomics. For NH$_2$D and ND$_2$H molecules the rotational and inversion degrees of freedom are mixed. Because of that, the coefficients $Q_\mu$ strongly depend on the quantum numbers of the transition. The same applies to the $\Lambda$-doublet transitions in such molecules as CH and OH, where electron spin decouples from the molecular axis as rotational quantum number $J$ increases. Microwave lines with large coefficients $Q_\mu$ can be used for astrophysical and laboratory search for possible variation of the constant $\mu$.

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