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Accurate theoretical predictions of the rovibrational energy levels of the helium hydride ion

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We present current progress towards accurate theoretical determination of rovibrational energy levels of the helium hydride ion and its isotopologues belonging to its electronic ground state. With the inclusion of nonadiabatic, relativistic and quantum-electrodynamic corrections through Nonadiabatic Perturbation Theory, a theoretical precision better than a few MHz can be achieved. Such an improved knowledge of the rovibrational spectrum should not only facilitate the construction of cosmological models of early Universe chemistry, but also set out a challenge for gas-phase spectrosopic measurements of matching precision.

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