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Long-range asymptotics of α^3-order QED corrections in H_2 and H_2^+

Monday 10 June 2024 18:00 (2 hours)

Hydrogen molecule and hydrogen molecular ion remain important for test of QED and the determination of fundamental constants. For both of them both the leading (α^3) and next-to-leading (α^4) QED corrections have been computed in the Born-Oppenheimer approximation. We present extremely accurate calculation of the asymptotic behavior of the QED correction for large inter-nuclear distances, including the large-R asymptotics of the Bethe logarithm. While these results are already implemented in the H2spectr code used to predict ro-vibrational levels of the H_2 molecule, but the details of their calculation have never been presented. In particular, the technique of the Bethe logarithm computation via convergence acceleration seem to be new, and might be useful for other atomic and molecular systems.

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