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pNRQCD at N^3LO: the potential for unequal masses and the Bc spectrum

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We determine the $1/m$ and $1/m^2$ spin-independent heavy quarkonium potentials in the unequal mass case with $\mathcal{O}(\alpha^3)$ and $\mathcal{O}(\alpha^2)$ accuracy, respectively. Furthermore, we discuss in detail different methods to obtain the potential and we provide the explicit field redefinition that relates them, thus clarifying the relation between different previous partial results.

Of special relevance is the computation of the manifestly gauge invariant $1/m$ and $1/m^2$ potentials in terms of Wilson loops with next-to-leading order (NLO) precision. As an application of our results we derive the theoretical expression for the Bc spectrum in the weak-coupling limit up to next-to-next-to-next-to-leading order (N^{3}LO).

Summary

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