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Effective field theory for long-range properties of bottomonium states

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Summary

We derive an analytical expression for the chromopolarizability of bottomonium states using the framework of potential nonrelativistic QCD. Next, using the QCD trace anomaly we obtain the two-pion production amplitude for the chromopolarizability operator and match the result to a chiral effective field theory for bottomonium states and pions as degrees of freedom. In this chiral effective field theory we compute long-range properties of bottomonium states such as the leading chiral logarithm correction to the mass of the $1S$ bottomonium and derive the van der Waals potential between two bottomonium states. Finally, we discuss the perspectives of using the developed chiral effective theory to evaluate two-pion decay amplitudes of bottomonium states.

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