Research Plans

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During my postdoctoral period, I would like to continue working on the application of operator product expansion (OPE) and effective field theories on atomic wave functions. In our first paper [1], we only discussed the asymptotic behavior of one electron going closer to one nucleus with nonrelativistic EFT and OPE. However, we can extend the method to the coalescence behavior of multiple electrons and nuclei. Also, we can discuss higher partial-wave operators and their impacts on the wave function. While one could measure the wave functions with weak value measurement, our method can provide insights on other atomic distributions. OPE could also apply to cold atom systems or nuclear systems, as first proposed by Braaten et al. in 2008. It is a possible direction to look into Coulomb interactions in nuclear systems, and investigate the long-distance quantity "contact" in such scenario. And I could also include higher order interactions in the short-range EFT/pionless EFT.

Another field of research I am interested in is the NRQCD factorization. With more experimental data in the future, I could further work on the production and decay properties of fully-heavy tetraquark [2, 3]. The physics of quarkonia or top quark and how NRQCD factorization works on these subjects also intrigues me. In general, I'm interested in different forms of EFTs and their applications in various scales of physics. Apart from these, I also have diverse interests in perturbative QCD and relevant topics.

References

[1] Y. Huang, Y. Jia, and R. Yu, (2018), arXiv:1809.09023 [hep-ph] .

[2] F. Feng, Y. Huang, Y. Jia, W.-L. Sang, X. Xiong, and J.-Y. Zhang, (2020), arXiv:2009.08450 [hep-ph] .

[3] F. Feng, Y. Huang, Y. Jia, W.-L. Sang, and J.-Y. Zhang, (2020), arXiv:2011.03039 [hep-ph] .