

Contribution ID: 144

Type: Contributed Talk

Nuclear structure effects in the Lamb shift of muonic deuterium in pionless effective field theory

Thursday, 3 August 2023 14:55 (15 minutes)

In this presentation, I will discuss the results for the $O(\alpha^5)$ effects of the nuclear structure, the two-photonexchange (TPE) corrections, in the energies of S-levels in muonic (μ D) and ordinary (D) deuterium. They were recently obtained at next-to-next-to-next-to-leading order (N3LO) in the pionless effective field theory (EFT). At this order, there is a single low-energy constant that is fitted to the hydrogen-deuterium isotope shift. This constant generates a correlation between the deuteron charge and Friar radii. This correlation can be used to judge how well a deuteron charge form factor parametrization describes the low-virtuality properties of the deuteron. The pionless EFT evaluation of the TPE corrections in μ D and D allows one to extract the deuteron charge radius r_d from the μ D Lamb shift, the 2S - 1S transition in D, and the 2S - 1S hydrogen–deuterium isotope shift in a unified approach, giving values of r_d that are in agreement [1,2]. I will also discuss the role of the TPE corrections generated by the structure of the individual nucleons.

V. Lensky, F. Hagelstein and V. Pascalutsa, Eur. Phys. J. A 58 (2022), 224 [arXiv:2206.14756 [nucl-th]].
V. Lensky, F. Hagelstein and V. Pascalutsa, Phys. Lett. B 835 (2022), 137500 [arXiv:2206.14066 [nucl-th]].

Primary authors: Dr LENSKY, Vadim (JGU Mainz); Dr HAGELSTEIN, Franziska (JGU Mainz, PSI Villigen); PASCALUTSA, Vladimir (JGU Mainz)

Presenter: Dr LENSKY, Vadim (JGU Mainz)

Session Classification: Thursday Parallel Session: Few-body systems (Atrium Maximum)