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Nuclear-structure effects in muonic deuterium MARCIN KALINOWSKI, KRZYSZTOF PACHUCKI , Faculty of Physics, University of Warsaw, Pasteura 5, 02-093 Warsaw, Poland, VLADIMIR YEROKHIN , Center for Advanced Studies, Peter the Great St. Petersburg Polytechnic University, 195251 St. Petersburg, Russia — Muonic deuterium is a subject of intense study due to the sensitivity of its spectrum to the electromagnetic moments of the nucleus. However, nuclear-structure effects make precise theoretical description of energy levels much harder than in the case of hydrogen. Recently, we've completed a systematic calculation of the leading nuclear polarizability contribution to the hyperfine splitting of the 2S state in muonic deuterium. Our result disagrees with the previous calculations and differs by 5 standard deviations from the experimental value. It suggests that the spin-dependent nuclear polarizability is not well understood. We have also calculated the electron vacuum polarization correction to the leading nuclear-structure contribution to the Lamb shift in muonic deuterium. This correction is surprisingly large and modifies the value of the deuteron-proton charge-radii square difference, which is consistent with the precise value obtained from the ordinary H-D isotope shift in the 1S-2S transition. This agreement is a strong evidence that the charge-radii values obtained from the measurements of muonic deuterium and muonic hydrogen are correct. It suggests that any occurring discrepancies with electronic systems are due to their underestimated uncertainties.

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