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The pion-nucleon sigma term from pionic atoms

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Early work suggested that the in-medium pion-nucleon threshold isovector amplitude b_1 gets renormalized in pionic atoms by about 30% away from its free-space value [1]. Weise attributed such renormalization to the leading low-density decrease of the in-medium quark condensate and the pion decay constant in terms of the pion-nucleon sigma term [2]. Subsequent work triggered by data from ‘deeply bound states’ in pionic atoms supported this idea [3]. Accepting the validity of this approach, we extracted the pion-nucleon sigma term from a large-scale fit of pionic-atom level shift and width data across the periodic table. Our fitted value for sigma is (57 ± 7) MeV and is robust with respect to variation of pion-nucleon interaction terms other than b_1 [4]. This value of sigma agrees with values obtained in several recent studies based on near-threshold pion-nucleon phenomenology [5], but sharply disagrees with values obtained in recent direct lattice QCD calculations [6].

- [1] Reviewed by C.J. Batty, E. Friedman, A. Gal, Phys. Rep. 287 (1997) 385.
- [2] W. Weise, Acta Phys. Pol. B 31 (2000) 2715, Nucl. Phys. A 690 (2001) 98c.
- [3] Reviewed by E. Friedman, A. Gal, Phys. Rep. 452 (2007) 89.
- [4] E. Friedman, A. Gal, Phys. Lett. B 792 (2019) 340.
- [5] Reviewed by J. Ruiz de Elvira, et al., J. Phys. G 45 (2018) 024001.
- [6] Reviewed by N. Yamanaka, et al. (JLQCD), Phys. Rev. D 98 (2018) 054516.

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