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Light Λ-hypernuclei and CSB interaction

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Charge symmetry breaking (CSB) in the mirror ${}^{4}_{\Lambda}\mathrm{H}$ $-{}^{4}_{\Lambda}\mathrm{He}$ hypernuclei has been known for decades. Recent experimental measurements [1,2] confirmed the large CSB splitting in the corresponding 0^+ states $\Delta B(0^+) = 233 \pm 92$~keV while the experimental value for the 1^+ excited states $\Delta B(1^+) = -83 \pm 94$~keV allows a change of sign, being compatible with zero. Theoretically, it was suggested by Dalitz and von Hippel (DvH) that large hypernuclear CSB might be generated through OPE contribution by allowing $\Lambda - \Sigma^0$ mixing in $SU(3)_f$ flavor octet [3]. This mechanism was later generalized by Gal [4] and used in a study of the 4-body hypernuclear CSB using χEFT(LO) ΛN interaction [5,6]. A rather different approach was adopted in Refs. [7,8] where hypernuclear CSB was introduced through a contact interaction fitted to the experimental $\Delta B(0^+)$ and $\Delta B(1^+)$ splittings. Interestingly, within the LO pionless effective field theory it was found that the CSB interaction fitted to these
energies might be linked through partially conserved baryon-baryon $SU(3)_f$ symmetry back to the DvH mechanism [9]. In my talk, I will review these works in order to give a general overview of the current status.
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