THE LIGHT-QUARK MAGNETIC MOMENT OF THE LAMBDA(1405) ANTIKAON-NUCLEON MOLECULE

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The Lambda(1405) baryon resonance has presented a mystery to the scientific community for many decades. Its unusually low mass, for a negative-parity baryon, challenges the quark model and indicates that the behaviour of baryon resonances are strongly influenced by their interactions with neighbouring states. In fact, recent developments in lattice QCD, together with finite-volume effective field theory, have revealed that the Lambda(1405) has a dominant contribution from an antikaon-nucleon molecular state. In this study, we examine both the strange and light quark sectors of the Lambda(1405) magnetic moment, using lattice QCD and effective field theory. The analysis of the light sector must take into account the role of disconnected fermion-loop contributions to the magnetic moment. We develop the graded symmetry approach, used to isolate these contributions, by including singlet baryons vital to a description of the Lambda(1405). The dominance of the antikaon-nucleon state reveals itself in two ways. Firstly, the vanishing strange magnetic moment near the physical point indicates that the strange quark is bound in a spinless antikaon, which cannot contribute to the magnetic moment of the Lambda(1405). Secondly, the light-quark sector magnetic moment is consistent with that of the nucleon, further strengthening the molecular interpretation of the Lambda(1405).