

Abstract Submitted
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Improving Limits on Anomalous Pseudoscalar Interactions using Few Body Calculations SHEAKHA ALDAIHAN, WILLIAM MICHAEL SNOW, Indiana Univ - Bloomington, DENNIS KRAUSE, Wabash College-Crawfordsville, Purdue University-Lafayette — Exotic long-range spin-dependent interactions between nucleons can be generated by many possible sources beyond the Standard Model. Anomalous interactions arising from exchange of ultralight bosons with pseudoscalar couplings g_P between free fermions are highly suppressed in the non-relativistic limit due to their spin dependence and suppression factors associated with the parity change at the vertex. As a consequence the experimental limits on such interactions are several orders of magnitude weaker than limits on spin-independent Yukawa interactions. We call attention to a physical process in the interaction between nucleons in separate nuclei exchanging a light pseudoscalar first identified by Krause and Fischbach¹ which can lead to a spin independent effect and, in combination with existing experimental constraints on exotic Yukawa interactions, can improve constraints on g_P for interaction ranges of atomic and mesoscopic scales. Similar nuclei models can also be used to improve constraints on P and T odd long-range interactions between scalar and pseudoscalar vertices. The theoretical evaluations of this effect will require knowledge of parity-odd matrix elements in nuclei.

¹Krause, D., et. al. (1993). Proceedings of the XXVIIIth Rencontre De Moriond. p.455.

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