

Abstract Submitted  
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**Improving Limits on Exotic Spin Dependent Long Range Forces using Double Boson Exchange**<sup>1</sup> SHEAKHA ALDAIHAN, WILLIAM MICHAEL SNOW, Indiana Univ - Bloomington, DENNIS KRAUSE, Wabash College-Crawfordsville, IN, JOSHUA LONG, Indiana Univ - Bloomington — The existence of very light weakly interacting particles that mediate new long range forces has been suggested in many extensions of the Standard Model. Such particles span a length scale between a  $\mu\text{m}$  and a few meters and include axions, familons, Majorons, and arions. Parameterizations of forces in this range show that they are composite-dependent, have a Yukawa shape, and have both spin-dependent as well as spin independent components. Very stringent limits on spin-independent couplings exist. For long range spin dependent forces, limits are weaker by 20 orders of magnitude compared to their spin independent analogs. The disparity in the limits raises the question of whether interesting limits on spin dependent couplings can be inferred from spin independent searches for long range forces. We show that this is possible using higher order contributions corresponding to double boson exchange and report the limits placed on spin dependent couplings using this method.

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