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Search for collisional exchange of ground-state atomic alignment between rubidium isotopes E.J. BAHR, D.F. JACKSON KIMBALL, California State University - East Bay, B. COSTE, Intitute Polytechnique de Grenoble, S.A. RANGWALA, Raman Research Institute, J.M. HIGBIE, Bucknell University, M.P. LEDBETTER, S.M. ROCHESTER, University of California at Berkeley, V.V. YASHCHUK, Lawrence Berkeley National Laboratory, D. BUDKER, University of California at Berkeley — The collisional transfer of pure atomic alignment (related to coherences between Zeeman sublevels with ΔM=2) between isotopes of rubidium is searched for using time-dependent magneto-optical rotation. Alignment-exchange collisions are fundamentally different than the commonly studied orientation-exchange collisions: for example, spin-exchange collisions preserve the net orientation in an atomic vapor (because of angular momentum conservation) but do not conserve alignment. Collisional transfer of alignment in alkali atoms has seldom been studied because the cross-sections are expected to be three to four orders of magnitude smaller than the nominal spin-exchange cross-sections. This is due to the fact that ground-state alkali atoms have electronic angular momentum J=1/2 and so the electronic state cannot support a ΔM=2 coherence. Thus collisional transfer of alignment is only possible because of hyperfine re-coupling during the collision. Implications of the measurement for searches for anomalous spin-dependent forces will be discussed.

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