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Evidence for Nuclear Magnetic Octupole Moments in 133Cs and 87Rb from Measurements of Hyperfine Intervals CAROL E. TANNER, VLADISALV GERGINOV, WALTER R. JOHNSON, University of Notre Dame — We previously performed high precision measurements of the 133Cs 6p 2P3/2 F=2, 3, 4, 5 hyperfine intervals from which we determined the hyperfine constants A, B, and C corresponding to the magnetic dipole, electric quadrupole, and magnetic octupole moments of the nucleus interacting with the orbital electrons. The existence of a nuclear magnetic octupole moment in Cs was revealed in Gerginov *et al.*, Phys. Rev. Lett. 91, 072501 (2003). These results were later confirmed by our measurements of the absolute optical frequencies of all hyperfine components of the 6s 2S1/2 F=3, 4–>6p 2P3/2 F=2, 3, 4, 5 transition, Phys Rev. A 70, 042502 (2004). During our investigations, we discovered existing measurements of the 87Rb 5p 2P3/2 F=0, 1, 2, 3 hyperfine intervals by Ye *et al.*, Opt. Lett. 21, 1280 (1996). We decomposed these measurements in terms of the constants A, B, and C and combine this value of C with relativistic MBPT atomic structure calculations to determine the nuclear magnetic octupole moment of 87Rb, Can. J. Phys. 87 (2009). We examined the influence of second order hyperfine corrections for both atoms and found no significant changes in the values of A, B, and C. Since the experimental uncertainties in Rb are relatively large more precise measurements are warranted.

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