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Hyperfine structure of $^{173}Yb^+$: towards resolving the ^{173}Yb nuclear octupole moment puzzle[1] DI XIAO, University of Nevada, Reno, JIGUANG LI, Institute of Applied Physics and Computational Mathematics, Beijing 100088, China, ANDREI DEREVIANKO, University of Nevada, Reno — Hyperfine structure (HFS) of atomic energy levels arises due to the interaction of atomic electrons with a hierarchy of nuclear moments. These contain magnetic dipole, electric quadrupole and higher rank nuclear moments. Recently, the octupole moment of the ^{173}Yb nucleus was extracted from HFS measurements in the $^3P_2$ state of neutral Yb [PRA 87, 012512 (2013)]. However, their value, $\Omega = -34.4\,\mathrm{b} \times \mu_\mathrm{N}$ is four orders of magnitude larger than the nuclear theory prediction, $\Omega = 0.003\,\mathrm{b} \times \mu_\mathrm{N}$. We propose to extract Ω and higher rank nuclear multipole moments from measuring hyperfine splittings in the first excited state ($4f^{13}(^2F^o)6s^2$, $J = 7/2$) of $^{173}Yb^+$. We present results of atomic structure calculations in support of proposed measurements.

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