

Abstract Submitted  
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**Progress towards measurement of the electron electric dipole moment using the PbF molecule: Spectroscopic constants of the known electronic states of PbF** CHRISTOPHER MCRAVEN, POOPALASINGAM SIVAKUMAR, MILINDA RUPASINGHE, University of Oklahoma, GREG HALL, TREVOR SEARS, Brookhaven National Laboratory, NEIL SHAFER-RAY, University of Oklahoma — The lead monofluoride molecule provides for a 1000- to 10,000-fold improvement in sensitivity to an electron electric dipole moment (e-EDM) over atomic-based measurements. The density of the relativistic electronic wave function near the lead nucleus leads to this exaggerated sensitivity. This density also leads to a mixing of the  $^2\Pi$  ground state with  $^2\Sigma$  excited states. For this reason, comparison of measurements of the electronic structure to calculation leads to a better understanding of the sensitivity of the molecule to an e-EDM. Here we present new spectroscopic constants for the  $A$ ,  $B$ ,  $C$ ,  $D$ ,  $E$ , and  $F$  states. It was previously believed that the  $A\ ^2\Sigma_{1/2}$  and the  $X_1\ ^2\Pi_{1/2}$  state formed a simple mixed  $^2\Pi - ^2\Sigma$  system. Our data suggest a more complicated system in which higher vibrational states of the  $A^2\Sigma_{1/2}$  electronic state mix with the  $X_1\ ^2\Pi_{1/2}$  state whereas the lower vibrational states mix with the  $D^2\Pi_{1/2}$  electronic state.

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