HIGH RESOLUTION ROTATIONAL SPECTROSCOPY STUDY OF THE ZEEMAN EFFECT IN THE $^2\Pi_{1/2}$ MOLECULE PbF

ALEXANDER BAUM, RICHARD MAWHORTER, and BENJAMIN MURPHY, *Department of Physics and Astronomy, Pomona College, Claremont, CA 91711*; TREVOR J. SEARS, *Chemistry Department Brookhaven National Laboratory, Upton, NY 11973 and Stony Brook University, Stony Brook, NY 11794*; T. ZH. YANG, P. M. RUPASINGHE, C. P. MCRAVEN[a], and N. E. SHAFER-RAY, *Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma, Norman, OK*; LUKAS D. ALPHEI and JENS-UWE. GRABOW, *Gottfreid-Wilhelm-Liebniz-Universität, Institut für Physikalische Chemie & Elektrochemie, D-30167 Hannover, Germany*.

Motivated by the ongoing search for the CP-violating electron electric dipole moment (e-EDM), rotational spectra of the radicals ^{207}Pb^{19}F and ^{208}Pb^{19}F were measured using a supersonic jet Fourier transform microwave spectrometer. Zeeman splitting was examined for 10 ^{207}PbF and 9 ^{208}PbF $J = 1/2$ and $J = 3/2$ transitions using three pairs of Helmholtz coils capable of generating magnetic fields up to ~ 4 Gauss. Transitions were observed with 0.5 kHz accuracy over a range of $2 - 26.5$ GHz. Zeeman splittings as small as 6 kHz were able to be resolved. The observation of these field dependent spectra allowed for the determination of the two body-fixed g-factors, $G_{\parallel}$ and $G_{\perp}$, of the electronic wave function. The final values obtained compare reasonably well with recently calculated values and will be reported at the meeting. The precise determination of the body fixed g-factors is an important step in a possible future e-EDM experiment using either the ^{207}Pb^{19}F or ^{208}Pb^{19}F molecule.

Acknowledgments: Work at Brookhaven National Laboratory was carried out under Contract No. DE-AC02-98CH10886 with the U.S. Department of Energy and supported by its Office of Basic Energy Sciences, Division of Chemical Sciences, Geosciences and Biosciences. Work by N. E. Shafer-Ray was performed with support from the National Science Foundatation award NSF-0855431. J.-U. Grabow acknowledges funding from the Deutsche Forschungsgemeinschaft and the Land Niedersachsen. RJM and ALB appreciate the support of a Sontag Research Fellowship from Pomona College.

[a]Current Address: Chemistry Department, Brookhaven National Laboratory, Upton, NY 11973