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The Interstellar Abundance of Lead: Experimental Oscillator Strengths for Pb II λ1203 and λ1433 and New Detections of Pb II in the Interstellar Medium

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Abstract. We present the first experimentally determined oscillator strengths for the Pb II transitions at 1203.6 Å and 1433.9 Å, obtained from lifetime measurements made using beam-foil techniques. We also present new detections of these lines in the interstellar medium from an analysis of archival spectra acquired by the Space Telescope Imaging Spectrograph onboard the *Hubble Space Telescope*. Our observations of the Pb II λ1203 line represent the first detection of this transition in interstellar gas. Our experimental f-values for the Pb II λ1203 and λ1433 transitions are consistent with recent theoretical results, including our own relativistic calculations, but are significantly smaller than previous values based on older calculations. Our new f-value for Pb II λ1433 (0.321 ± 0.034) yields an increase in the interstellar abundance of Pb of 0.43 dex over estimates based on the f-value listed by Morton. With our revised f-values, and with our new detections of Pb II λ1203 and λ1433, we find that the depletion of Pb onto interstellar grains is not nearly as severe as previously thought, and is very similar to the depletions seen for elements such as Zn and Sn, which have similar condensation temperatures.

Keywords. ISM: abundances, atoms — methods: laboratory — ultraviolet: ISM

Experimental oscillator strengths for the Pb II transitions at 1203.6 Å and 1433.9 Å were obtained from lifetime measurements made using beam-foil techniques. These f-values were used to derive interstellar column densities of Pb II from newly detected Pb II lines in archival *Hubble Space Telescope* spectra. Full results may be found in Heidarian *et al.* (2015) and A. M. Ritchey *et al.* (in preparation).

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Reference

Heidarian, N., Irving, R. E., Ritchey, A. M., Federman, S. R., Ellis, D. G., Cheng, S., Curtis, L. J., & Furman, W. A. 2015, *ApJ*, 808, 112