Abstract Submitted
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Laser Threshold Photodetchment Spectroscopy of the P- Ion D. PEGG, Dept of Physics, University of Tennessee, Knoxville, P. ANDERSSON, C. ALFREDSSON, C. DIEHL, G. COLLINS, D. HANSTORP, Dept. of Physics, Gothenburg University, Gothenburg, Sweden, P. SCHEF, R. THOMAS, Dept. of Physics, Alba Nova, Stockholm University, Stockholm, Sweden — The electron affinity of the P atom and the fine structure splittings of the $P^-(^3P_J)$ state have been measured in high resolution by use of the Laser Threshold Photodetachment method. In the collinear beams experiment, tunable infrared radiation from an OPO/OPA system was used to detach an electron from the P- ion. The relative cross section for the process was monitored by detecting the residual ground state P atom. Three thresholds were observed, corresponding to the opening of the channels: $\gamma + P^-(3s^2 3p^4\ ^3P_J) \rightarrow P(3s^2 3p^3\ ^4S_{3/2}) + e^-$ with J=2,1,0. The Wigner law was fitted to the threshold data and used to determine the threshold energies. The Doppler shift associated with the moving ions was eliminated by determining their velocity using the measured the red- and blue-shifted threshold energies associated with co- and counter-propagating laser and ion beams [1]. A calibrated wave-meter was used to establish the wavelength scale of the OPO/OPA system. The newly measured values of the electron affinity of the P atom and the fine structure intervals of the P- ion represent a significant improvement in precision over the current recommended values [2]. [1]. P.Juncar, et al., Phys. Rev. Lett., 54, 11(1985). [2] T.Andersen, H.K.Haugen and H.Hotop, J. Phys. and Chem. Ref. Data, 28, 1511 (1999).

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