

Photodetachment spectroscopic studies of cold, trapped negative ions

Wednesday 10 July 2024 12:08 (22 minutes)

Photodetachment spectroscopy is a powerful spectroscopic technique for determining the internal state distribution of a molecular anion. Previously, our group studied the threshold photodetachment spectroscopy of CN^- at both 16 K and 295 K in a 22-pole ion trap and measured the electron affinity of CN with great precision (EA: 3.864(2) eV) [1]. Here we present the threshold photodetachment spectroscopy study of C_2^- , speculated to exist in the interstellar medium, in a radiofrequency 16-pole ion trap at 8 Kelvin. We investigated the behaviour of the cross section near the threshold for the ground state transition, $\text{C}_2\text{X } ^1\Sigma_g^+ \leftarrow \text{C}_2^- \text{X } ^2\Sigma_g^+$. We measured the electron affinity of C_2 which is consistent with the previously measured values [3][4]. We also present the status of the absolute cross section and near threshold photodetachment spectroscopic studies of the naphthyl anion ($\text{C}_{10}\text{H}_7^-$), a polyaromatic hydrocarbon anion (PAH), which may also play a role in interstellar chemistry [5].

[1]. M. Simpson et al., J. Chem. Phys. 153, 184309 (2020).

[2]. M. Nötzold, R. Wild, C. Lochmann, R. Wester., Phys. Rev. A 106, 023111 (2022). "

[3]. K. M. Ervin and W. C. Lineberger., J. Phys. Chem. 95, 2244 (1991).

[4]. B. A. Laws, S. T. Gibson, B. R. Lewis, R. W. Field., Nat. Commun. 10, 1(2019).

[5]. M. L. Weichman J. B. Kim, J. A. Devine, D. S. Levine, D. M. Neumark J. Am. Chem. S 137,4 (2015).

Author: PURUSHU MELATH, Sruthi

Co-authors: Ms LOCHMANN, Christine (University of Innsbruck); Dr ERATH-DULITZ, Katrin (Universität Innsbruck); Dr NOTZÖLD, Markus (Universität Innsbruck); Mr HAUCK, Michael (Universität Innsbruck); Dr WILD, Robert (Universität Innsbruck); Prof. WESTER, Roland (Universität Innsbruck)

Presenter: PURUSHU MELATH, Sruthi

Session Classification: Molecular Spectroscopy

Track Classification: Molecular Spectroscopy