A comprehensive study of Interatomic Coulombic Decay in argon dimers: Extracting R-dependent absolute decay rates from the experiment

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Synopsis We present a comprehensive study of Interatomic Coulombic Decay (ICD) in argon dimers.

After irradiating argon dimers with XUV-synchrotron radiation Interatomic Coulombic Decay occurs opening up a manifold of different decay channels. We observe these channels and the corresponding initial and final states are assigned. Additionally, the effect of nuclear dynamics on the ICD electron spectrum is examined for one specific decay channel. The internuclear distance-dependent width $\Gamma(R)$ of the decay is obtained from the measured kinetic energy release distribution of the ions employing a classical nuclear dynamics model. Which is then tested by a quantum mechanical simulation.

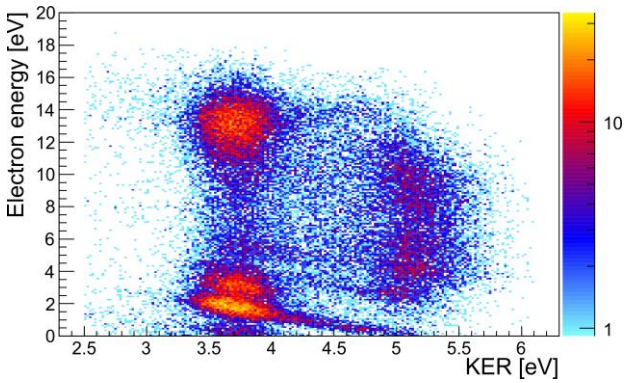

Figure 1 Experimental yield as function of the electron energy and the kinetic energy release. Several diagonal lines are visible indicating different decay channels [1].

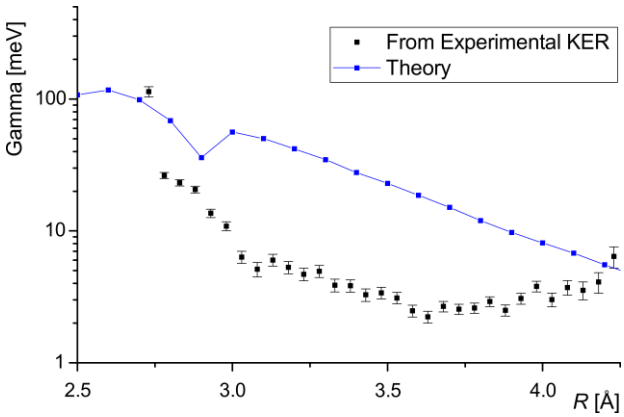

Figure 2. Calculated Γ(R) (black) compared to the theoretical prediction (blue) for the $(^1\boldsymbol{D})\boldsymbol{4d}(^2\boldsymbol{S})$ state [1].

References

[1] J. Rist, T. Miteva, B. Gaire, H. Sann, F. Trinter, M. Keiling, N. Gehrken, A. Moradmand, B. Berry, M. Zohrabi, M. Kunitski, I. Ben-Itzhak, A. Belkacem, T. Weber, A. L. Landers, M. Schöffler, J. B. Williams, P. Kolorenč, K. Gokhberg, T. Jahnke, R. Dörner 2017 *Chem. Phys.* ***482*** *185–191*

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