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Abstract

Velocity Map Imaging of Molecular Dynamics Processes

Velocity map imaging[i] is a high resolution variant of the ion-imaging technique introduced by Chandler and Houston[ii] in 1987. Using an electrostatic immersion lens we showed that the velocity (speed and angle) of nascent molecules can be mapped onto a two-dimensional detector essentially independent of their position of formation. This greatly improved the resolution of the ion imaging approach and the method is now in wide use throughout the world[iii]. In this talk I will review a few of the most recent improvements in the imaging technique including spatial map imaging, image magnification and slicing. Several highlights of our recent work on the photodissociation of small molecules[iv] and van der Waals clusters[v] and on inelastic scattering will be given.

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[i] A.T.J.B. Eppink and D.H. Parker. *Velocity map imaging of ions and electrons using electrostatic lenses; Application in photoelectron and photofragment ion imaging of molecular oxygen.* Rev. Sci. Instr. **68** (1997) 3477-3484.

[ii] D. W. Chandler and P. L. Houston, J. Chem. Phys. **87** (1987) 1062.

[iii] Michael N.R. Ashfold, N. Hendrik Nahler, Andrew J. Orr-Ewing, Olivier P.J. Vieuxmaire, Rachel L. Toomes, Theofanis N. Kitsopoulos, Ivan Anton Garcia, Dmitri A. Chestakov, Shiou-Min Wu and David H. Parker, *Imaging the dynamics of gas phase reactions,* Phys. Chem. Chem. Phys. (2006) **8**, 26-53 .

[iv] D.A. Chestakov, D.H. Parker, K.V. Vidma and T.P. Rakitzis, *Photofragment alignment in the photodissociation of I_2 from 450 to 510 nm,* J. Chem. Phys. **124** (2006) 024315.

[v] Alexey V. Baklanov, Georgii A. Bogdanchikov, Konstantin V. Vidma, Dmitri A. Chestakov, and David H. Parker, *Cluster-enhanced X–O_2 photochemistry (X=CH_3I, C_3H_6, C_6H_{12}, and Xe)* J. Chem. Phys. **126**, 124316 (2007).