A 20: Poster – Atomic Clusters

Time: Wednesday 17:00–19:00 Location: Philo 1. OG

A 20.1 Wed 17:00 Philo 1. OG

Towards experimental studies of interatomic Coulombic electron capture (ICEC) — •Andre Giraldi[1], Deepthy Mootheril[1], Nicolas Sisourat[2], Thomas Pfeifer[1], and Alexander Dorn[1] — [1]Max Planck Institut für Kernphysik, Heidelberg, Germany — [2]Sorbonne Universite, Paris, France

This work targets the experimental detection of an environment assisted atomic decay mechanism, referred to as Interatomic Coulombic Electron Capture, or ICEC. This process consists of a free electron being captured by an atom or molecule, and the excess energy being transferred to a neighbor, ionizing or exciting it. Despite the promising theoretical results [1], there has been so far no experimental detection of ICEC. Aiming to obtain first experimental results, we propose a reaction envolving NeAr dimers:

e + Ne(2p6)Ar –> Ne*-(2p5 3s2)Ar –> Ne-(2p5 3s)Ar+ + e –> NeAr + e + hf

Presently we are adapting an electron and ion momentum spectrometer (reaction microscope) and are optimizing the formation of mixed neon-argon dimers or larger clusters. First results on electron impact ionization will be presented, which confirm the formation of the mixed species and show reactions like Interatomic Coulombic Decay (ICD) taking place.

[1] Jan Šenk, Vincent Graves, Jimena D. Gorfinkiel, Přemysl Kolorenč, Nicolas Sisourat. J. Chem. Phys. 7 November 2024; 161 (17): 174113.

A 20.2 Wed 17:00 Philo 1. OG

Experimental investigation of non-nearest-neighbour ICD after 2s ionization in Ne clusters — •Johannes Viehmann[1], Adrian Krone[1], Niklas Golchert[1], Yusaku Terao[1], Catmarna Küstner-Wetekam[1], Lutz Marder[1], Arno Ehresmann[1], Noelle Walsh[2], Antti Kivimäki[2], and Andreas Hans[1] — [1]Institut für Physik und CINSaT, Universität Kassel, Heinrich-Plett-Str. 40, 34132 Kassel, Germany — [2]MAX IV Laboratory, Lund University, Fotongatan 8, 224 84 Lund, Sweden

Interatomic Coulombic Decay (ICD) is an energy-transfer process in weakly bound matter, typically assumed to act dominantly between nearest neighbors. Following recent theoretical prediction, we report experimental evidence for non ICD. Using synchrotron radiation to ionize the Ne 2s shell in Ne clusters and electron-electron coincidence measurements with a time-of-flight spectrometer, we present ICD electron spectra that isolate decay channels beyond the nearest-neighbor shell. The data show qualitative agreement with the expected non-local ICD mechanism. Measurements were performed using the Transverse Resonance Island Buckets (TRIBs) at the MAX IV synchrotron (Lund, Sweden), enabling simultaneous multibunch and pseudo-single-bunch operation at different beamlines by adjusting the respective optics to distinct electron orbits.