

Neutralisation of highly charged ions at surfaces

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Radiative and non-radiative decay are both important de-excitation mechanisms of ions. To study these processes, collisions including ions in very high charge states ($q \geq 20$) are an ideal playground: When close to a surface, resonant electron transfer leads to a population of high- n shells (with $n \sim q$ [1]), initiating a de-excitation cascade of this – then neutral albeit still highly excited – projectile. X-ray emission is one of the de-excitation channels, however the measured yield drops with decreasing ion charge states [2,3]. To understand this behaviour it is crucial to consider also competing mechanisms, e.g. non-radiative Auger-like processes leading to the emission of electrons instead of photons.

We perform coincidence measurements to correlate the ion charge states after transmission through atomically thin samples [4] with electrons emitted during the interaction (energy and yield information) [5]. This allows us to disentangle de-excitation channels and identify participating processes in the neutralisation of highly charged ions upon interaction with a surface.

References

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