

Condensed Matter Theory Seminar

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Interaction of slow highly charged ions with freestanding short-range ordered organic nanosheets and crystalline 2D materials - from fundamental processes to applications in structural analysis

Heavy ions with low velocity and in high charge states undergo a complex set of neutralization and de-excitation processes when interacting with solid surfaces. While charge transport from a surface to the ion leading to the neutralization is well described by a classical over-barrier process, the subsequent de-excitation of the projectile involves radiative and non-radiative channels. As it turns out, one particular non-radiative two-center energy transfer channel (Interatomic Coulombic Decay, ICD) dominates under certain conditions and it can be well-described in terms of the exchange of virtual photons between surface and ion. Employing the interatomic distance dependence of the ICD process allows us to link a specific charge exchange to a scattering angle of the ion, i.e. a specific trajectory. Consequently, angle-resolved charge exchange spectroscopy of slow highly charged ions can be used as a characterisation tool for short-range ordered organic nanosheets in the limit of small material thicknesses. The method will be presented and its limitations discussed.

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