Electronic properties and vertical transport in Metal/2D Material/Metal heterostructures for resistive switching Atomristors

Two-dimensional (2D) materials offer unique opportunities for exploring electronic phenomena especially in advanced atomic-scale devices. This seminar delves into the mechanisms of vertical electronic transport and interface effects in systems comprising 2D materials interacting with metallic electrodes, with a particular focus on their role in resistive switching at the atomic scale.

We will analyze how the intrinsic properties of 2D materials, including graphene, $MoSe_2$ (1T and 2H phases), and hBN, influence the characteristics of metal/2D material/metal interfaces, considering factors such as thickness, and stacking configurations. The seminar will also address key phenomena like ionic migration and filament formation, which are crucial for resistive switching.

Using theoretical methods based on Density Functional Theory (DFT) and Non-Equilibrium Green's Functions (NEGF), the presentation will highlight the critical role of metal–2D material interactions in designing atomic-scale resistive memories and advancing the fundamental understanding of next-generation nanoelectronics.