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Hydrogen dynamics in defective graphene

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Understanding the adsorption of hydrogen atoms on graphene is of paramount
importance in a number of fields as diverse as nanoelectronics, energy and hydrogen storage and interstellar chemistry and it appears closely linked to the controversial issue of its mobility at the carbon surface. The recent development of chemical method for producing graphene in gram-scale has opened the doors towards technological applications and characterization techniques that are usually reserved to bulk systems.
In this presentation, I will discuss the dynamics of atomic hydrogen, bonded at
the surface of chemically produced defective graphene, as probed by inelastic neutron scattering (INS). The behavior of hydrogen onto the graphene planes appears strongly dependent on the specificity of the sample, namely the presence of surface defects, synthesis, manipulation and hydrogenation conditions. I will show that the hydrogen local environment can be efficiently investigated thanks to its influence on the dynamics of hydrogen itself.
Finally, I will present a brief overview about the complementary use of Neutron and X-Ray scattering in the study of the dynamical properties and local structure of materials for energy applications based on Carbon and beyond.

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