Resonance Raman spectroscopy in twisted graphene hetero-structures and monolayer MoS_2

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Abstract

The pioneering experiments with graphene in 2004 opened a new area of research in science, which is the study of two-dimensional (2D) crystals. The behavior of the electrons in these materials depends not only on the atomic and crystalline structure, but also on the number of layers and the stacking order between layers. For example, the electronic structure of bilayer graphene depends strongly of the twisting angle between the layers. In this presentation, I will first discuss how Raman spectroscopy provides information about electrons, phonons and their interactions in 2D materials. I will present a multiple excitation Raman study in MoS_2, where we could evidence electron scattering processes by different types acoustic phonons and involving different valleys in the electronic structure [1]. I will then present results in twisted bilayer samples and graphene on the top of h-BN and show the ability of resonance Raman spectroscopy to probe and distinguish interlayer and intralayer electron-phonon interactions in graphene heterostructures [2]

Figures

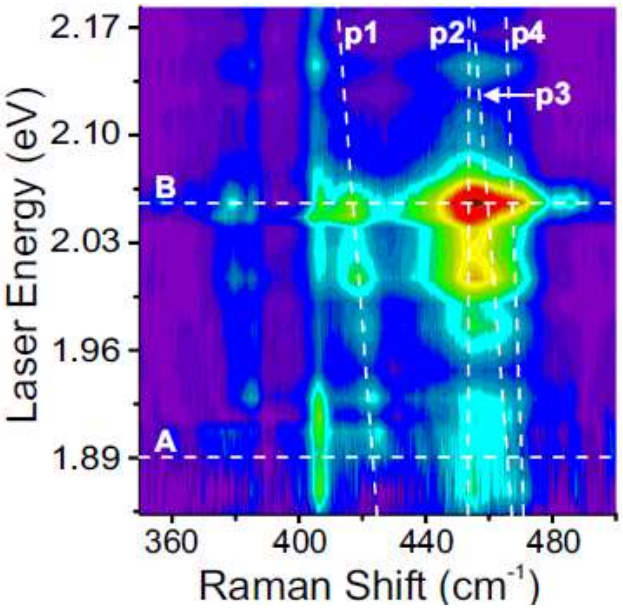

Figure 1: Resonance Raman map of the double-resonance Raman features in monolayer MoS_2

References

[1] B. R. Carvalho et al. Nature Comm. 8, (2017) 14670

[2] G. S. N. Eliel et al. Nature Comm. 9, (2018)1221