Seminários de Física

Centro de Física da Universidade do Minho

Sexta-Feira, 18 de Janeiro às 16h
Anfiteatro da Física

Electronic spectral properties of incommensurate van der Waals structures

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Bruno Amorim obtained his PhD in Condensed Matter Theory and Nanotechnology in 2016 from Universidade Autónoma de Madrid (Madrid, Spain). From 2016 to 2018, he was a Marie Skłodowska-Curie fellow at Instituto Superior Técnico (Lisboa, Portugal), where heis currently a visiting researcher. Bruno Amorim work focuses on the theory of two-dimensional and layered materials, with a focus on its electronic, transport and optical properties.

Resumo: Multilayered van der Waals structures, formed by staked two-dimensional materials, have emerged in recent years as new platforms for the study of fundamental condensed matter and the development of electronic/optical devices. These structures, due the mismatch/misalignment between different layers, often lack periodicity, which makes their modelling very challenging. Building on previous work for bilayers, we develop a tight-binding based, momentum space formalism capable of describing incommensurate multilayered van der Waals structures for arbitrary lattice mismatch and/or misalignment between different layers. We demonstrate how the developed formalism can be used to model angle-resolved photoemission spectroscopy measurements, and scanning tunnelling spectroscopy which can probe the local and total density of states. The general method is then applied to model angle-resolved photoemission spectroscopy in twisted bilayer structures and comparison to experimental data is made. The general method is also used to study incommensurate twisted trilayer graphene structures, where it is found that the coupling between the three layers can significantly affect the low energy spectral properties, in a way which cannot be simply attributed to the pairwise hybridisation between the layers