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**Non-Abelian gauge potentials in graphene bilayers**
JOSE GONZALEZ, PABLO SAN-JOSE, Instituto de Estructura de la Materia, CSIC, Madrid, FRANCISCO GUINEA, Instituto de Ciencia de Materiales de Madrid, CSIC, Madrid — We discuss the effect of spatial modulations in the interlayer hopping of graphene bilayers, such as those that arise upon shearing or twisting. We show that their single-particle physics, characterized by charge localization and recurrent formation of zero-energy bands as the pattern period L increases, is governed by a non-Abelian gauge potential arising in the low-energy electronic theory due to the coupling between layers. We find that such gauge-type couplings give rise to a confining potential that, for certain discrete values of L, localizes states at zero energy in particular regions of the Moire patterns. We also draw the connection between the recurrence of the flat zero-energy bands and the non-Abelian character of the potential.

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