

# Heavy quasiparticles and cascades without symmetry breaking in twisted bilayer graphene

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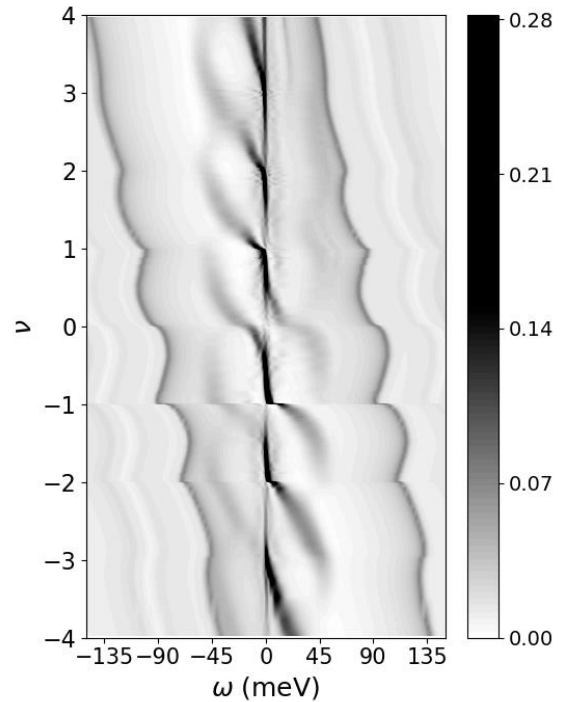
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Twisted bilayer graphene (TBG) shows a great variety of correlated phases. In particular, cascades in the spectroscopic properties and in the compressibility in a large range of energies, twist angle and temperature have been observed. We have studied [1] an eight (per spin and valley) orbital model for  $\theta=1.08^\circ$  TBG, including the intra- and inter-orbital interactions [2], within a self-consistent dynamical mean field theory (DMFT) + Hartree approximation. Symmetry breaking is not allowed. We reproduce the observed cascade flow of spectral weight [3,4,5], the oscillations of the remote band energies [3] and the asymmetric jumps in the inverse compressibility [5]. Our results show that the spectral weight reorganization associated to the formation of local moments and heavy quasiparticles, and not a symmetry breaking process, is responsible for the cascade phenomena.

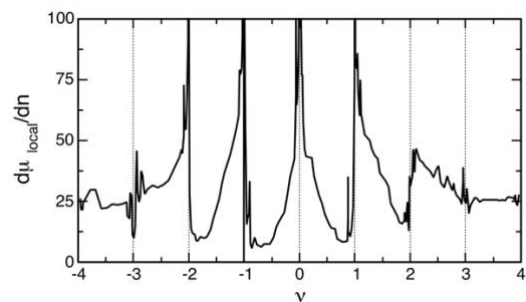
## References

- [1] A. Datta, M.J. Calderón, A. Camjayi, E. Bascones, arXiv:2301.13024
- [2] M.J. Calderón and E. Bascones, Phys. Rev. B 102 (2020) 155149
- [3] D. Wong et al, Nature 582 (2020) 198
- [4] Y. Choi et al, Nature 589 (2021) 536
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## Figures



**Figure 1:** Color plot of the density of states resulting from the DMFT+Hartree calculations as a function of doping and energy showing the cascades. See [3] for the experimental plots.



**Figure 2:** Local inverse compressibility resulting from our calculations as a function of doping. We find the asymmetric peaks observed in [5].