Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **4017** Type: **Poster (Non-Student) / Affiche (Non-étudiant(e))**

(POS-28) Higher-order electron-phonon interactions and their effect on the dielectric and thermal properties of strongly-correlated 2D Dirac crystals

Tuesday 20 June 2023 17:54 (2 minutes)

The unique structure of two-dimensional (2D) Dirac crystals, with electronic bands linear in the proximity of the Brillouin-zone boundary and the Fermi energy, creates anomalous situations where small Fermi-energy perturbations critically affect the electron-related lattice properties of these systems.[1] We have studied the interaction of these electrons with acoustic phonons, where the phonon frequency is also linear in their wavenumber. We show that in these systems considering higher-order electron-phonon interaction terms is essential to understand many critical crystal properties, including the dielectric function and the thermal conductivity, which we will present as a function of temperature in the special case of graphene.

[1] Kazemian and Fanchini, J. Phys.: Condens. Matter 35 325601 (2023)

Keyword-1

2D Dirac crystals

Keyword-2

Thermal conductivity

Keyword-3

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Session Classification: DCMMP Poster Session & Student Poster Competition (9) | Session d'affiches DPMCM et concours d'affiches étudiantes (9)

Track Classification: Technical Sessions / Sessions techniques: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)