Publ. Astron. Obs. Belgrade No. 103 (2024), 74 *Progress Report*
https://doi.org/10.69646/aob103p074

INTERACTION OF IONS WITH GRAPHENE-INSULATOR-GRAPHENE COMPOSITE SYSTEMS

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Abstract. The hybridization between Dirac plasmons from graphene and surface optical phonons from the Al_2O_3 layer is investigated. The analysis focuses on the interaction of ions moving parallel and above graphene-insulator-graphene systems with the mentioned composites. Specifically, it examines the impact of this hybridization on the induced wake potential in the top surface of the system (Despoja et al. 2019 and Kalinić et al. 2021), as well as on the stopping and image forces acting on the incident particle (Kalinić et al. 2022). The effective dielectric function required to calculate these quantities is derived using two methods: one based on massless Dirac fermions and the other on the extended hydrodynamic model. A comparison with the *ab initio* method is given. The study demonstrates how various factors such as the doping density of graphene, the thickness and dielectric properties of the Al_2O_3 layer, the damping factor of Dirac plasmons, particle speed, and distance from the system influence the induced wake potential, stopping force, and image force.

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