

ОПТИКА И ЛАЗЕРНАЯ ФИЗИКА

CHANGES IN THE OPTICAL ABSORPTION COEFFICIENT
AND REFRACTIVE INDEX OF MONOLAYER GERMANENE
IN THE MAGNETIC FIELD

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In this study, we conduct a theoretical analysis of the optical absorption coefficients (OACs) and refractive index changes (RICs) arising from intraband and interband transitions in monolayer germanene under the influence of a magnetic field. The findings reveal that both OACs and RICs blueshift as the magnetic field strength increases. Notably, the peaks associated with spin-up states consistently appear to the right of those corresponding to spin-down states. This distinction in peak positions is attributed to the strong spin-orbit coupling (SOC) characteristic of monolayer germanene. For intraband transitions, the OACs and RICs exhibit a single peak in the terahertz (THz) region...

Keywords: spin-orbit, germanene, absorption, dipole, refractive.

Introduction. The magneto-optical method serves as a vital tool for experimentally probing the energy band structure of semiconductors [1]. Although DFT is effective for probing ground state electronic structures [2–4], its direct application under an external magnetic field is limited, because the Landau gauge yields a spatially non-periodic vector potential, rendering conventional periodic boundary DFT methods inadequate for capturing discrete Landau levels and related magnetic phenomena...

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