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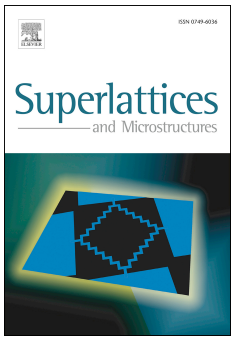

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Spin heat capacity of monolayer and AB-stacked bilayer MoS_2 in the presence of exchange magnetic field

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Abstract

Dirac theory and Green's function technique are carried out to compute the spin dependent band structures and corresponding electronic heat capacity (EHC) of monolayer (ML) and AB-stacked bilayer (BL) molybdenum disulfide (MoS_2) two-dimensional (2D) crystals. We report the influence of induced exchange magnetic field (EMF) by magnetic insulator substrates on these quantities for both structures. The spin-up (down) subband gaps are shifted with EMF from conduction (valence) band to valence (conduction) band at both Dirac points in the ML because of the spin-orbit coupling (SOC) which leads to a critical EMF in the K point and EHC returns to its initial states for both spins. In the BL case, EMF results split states and the decrease (increase) behavior of spin-up (down) subband gaps has been observed at both K and K′ valleys which is due to the combined effect of SOC and interlayer coupling. For low and high EMFs, EHC of BL MoS_2 does not change for spin-up subbands while increases for spin-down subbands.

Keywords: *MoS_2; Spin; Green's function; Electronic heat capacity; Exchange magnetic field*

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