Erratum: Current-induced spin and orbital polarization in the ferroelectric Rashba semiconductor GeTe [Phys. Rev. Research 7, 043329 (2025)]

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A correction of the presented orbital angular momenta (OAM) and the orbital Edelstein effect (OEE) in the original article has to be made, with an overall sign change. This sign change arises from the relation of OAM ($\boldsymbol{l}_{nk}$) and the orbital magnetic moment ($\boldsymbol{m}^l_{nk}$), $\boldsymbol{m}^l_{nk} = -\frac{g_l \mu_\mathrm{B}}{\hbar}\boldsymbol{l}_{nk}$, where the factor of (-1) was missing in our self-made code. Consequently, all reported orbital textures and the orbital Edelstein susceptibility tensors must be multiplied by a factor of (-1). Specifically, this change results in a reversion of orbital textures in Figs. 3, 5, and 7, and in an inversion of the OEE in Figs. 4, 5, and 8. The spin-related results remain unchanged.

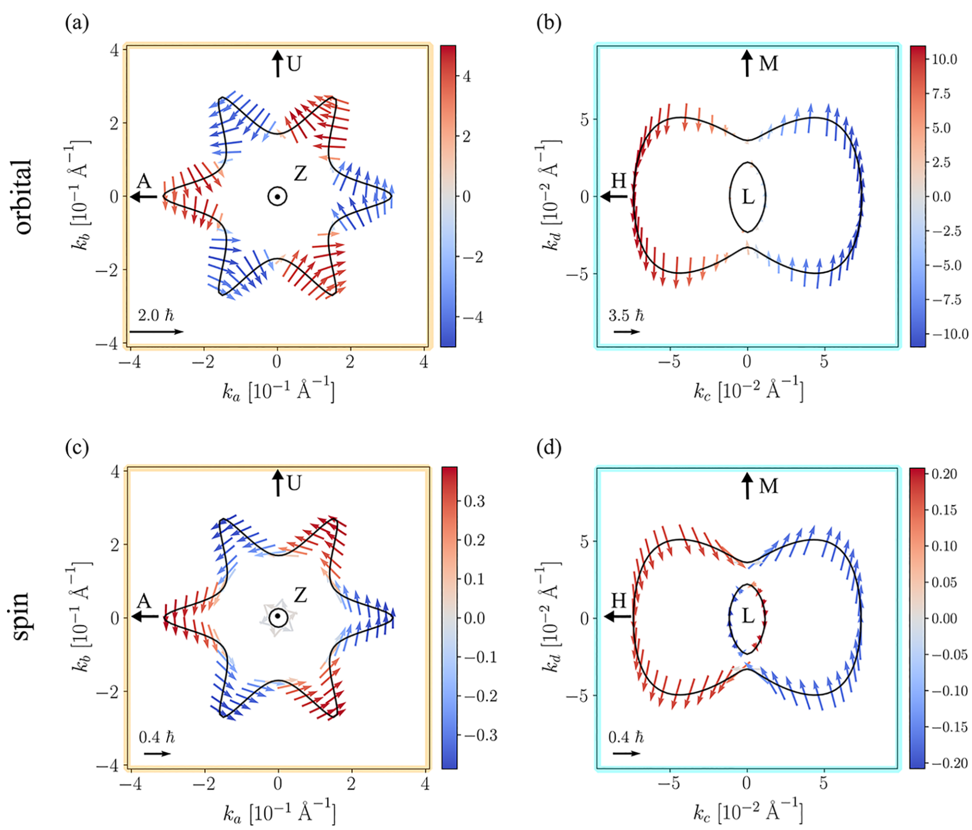

FIG. 3. Isoenergy lines at planes Z and L for $\mathcal{E} = -0.41$ eV from the Fermi energy, with the orbital [panels (a) and (b)] and spin [panels (c) and (d)] textures. The lines correspond to the isoenergy k points at the surface of the Brillouin zone, which contain the Z [panels (a) and (c)] and L [panels (b) and (d)] points, highlighted in Fig. 2(f). The color corresponds to the out-of-plane spin and orbital component in units of $\hbar$, and the arrows indicate the in-plane spin and orbital components in the respective planes. Note that panels (a), (c) and (b), (d) use different k scales for better visualization of the isoenergy lines at planes Z and L.

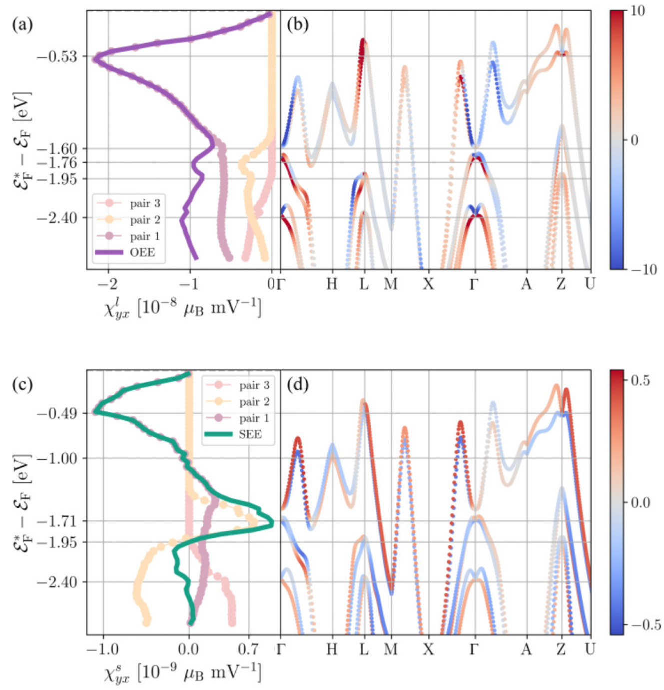

FIG. 4. Orbital and spin Edelstein susceptibility. (a) Band-resolved orbital Edelstein susceptibility in GeTe calculated with the Wannier tight-binding model. (b) Band structure with the y component of the orbital expectation values in units of $\hbar$. (c), (d) Same as panels (a) and (b), but for the spin degree of freedom. Calculations were performed for $V_0 = 56.8$ Å^3, $g_s = 2$, $g_l = 1$, and $\tau_0 = 10$ fs, which is the typical order of magnitude reported for GeTe [69–71].

This correction does not modify the conclusion of the manuscript. The discussion based on OAM and orbital Edelstein effect figures remains unchanged. Furthermore, the new orbital texture and OEE are in agreement with reported results in Refs. [1] and [2], respectively.

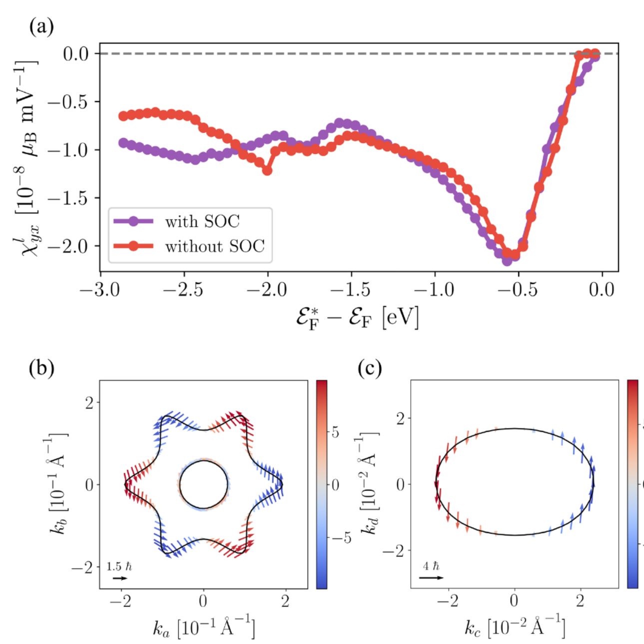

FIG. 5. (a) Comparison of the OEE with and without SOC. Isoenergy line and orbital texture of GeTe without SOC on (b) plane Z and (c) plane L, at $\mathcal{E} = -0.41$ eV. The arrows represent the orientation of the in-plane components, and the color shows the value of the out-of-plane component in units of $\hbar$. Note the different k scales in panels (b) and (c) for better visualization of the isoenergy lines.

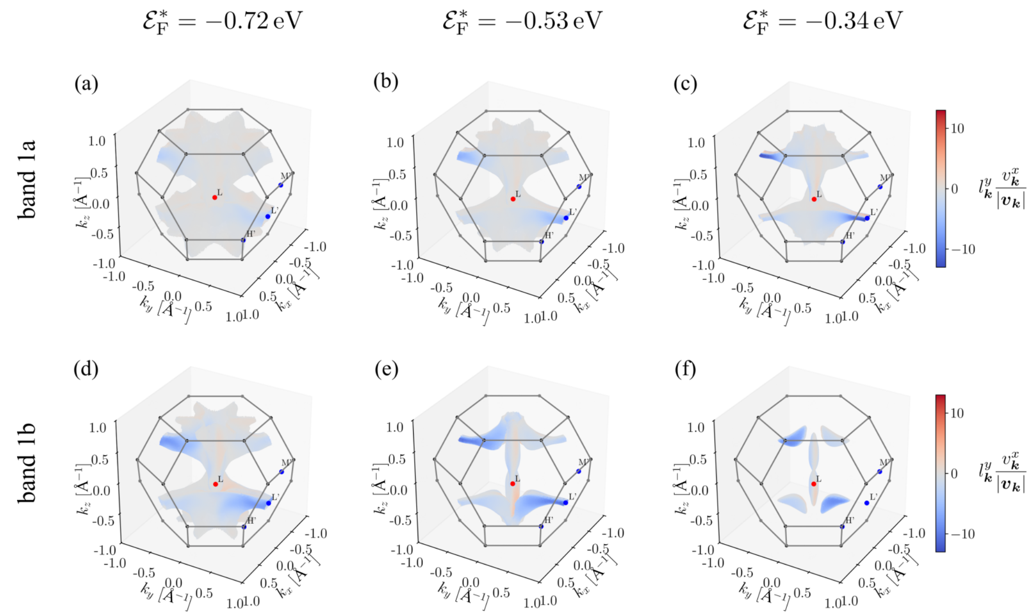

FIG. 7. Isoenergy surfaces of the top valence band (top row) and the second (bottom row) valence band at various energies around the global maximum of the OEE: -0.72 eV [panels (a) and (d)], -0.53 eV [maximum OEE, panels (b) and (e)], and -0.34 eV [panels (c) and (f)]. The color scale represents the contribution of each state to the OEE susceptibility tensor χ^{l}_{yx} (in unitary $\hbar$): Each state at the respective Fermi surface contributes $\propto l_{k_y} v_{k_x}/|v_{\mathbf{k}}|$. Around the band crossing ($\mathcal{E} = -0.37$ eV), pronounced hot spots of this integrand occur, in particular, in the topmost band.

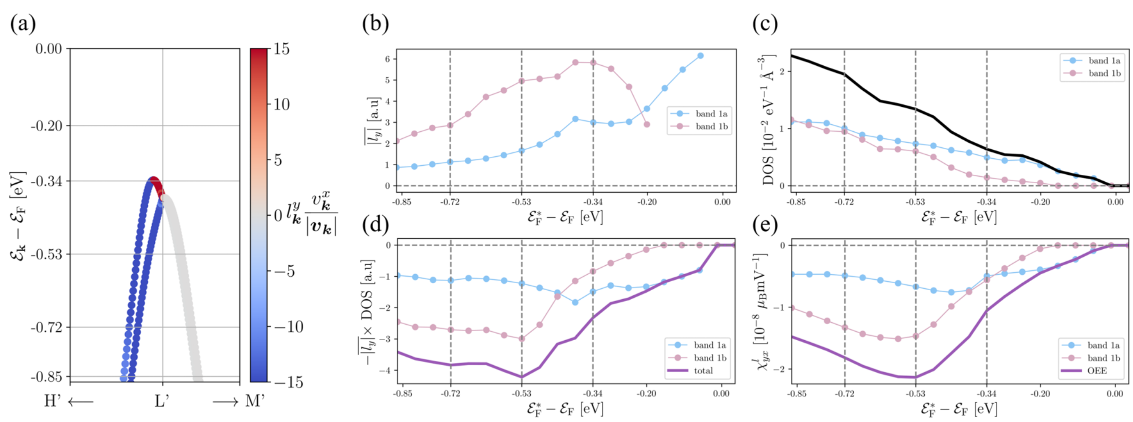

FIG. 8. (a) Band structure around the symmetry points indicated by blue dots in Fig. 7, with the contribution of each state to the OEE susceptibility tensor χ^{l}_{yx} (in arbitrary units). Energy dependence of (b) the average y component of the orbital angular momentum along y, (c) the density of states, (d) the product of (b) and (c), and (e) the OEE susceptibility χ^{l}_{yx}. Blue and red curves indicate the contributions of the top (1a) and second (1b) bands, respectively.

[1] L. Ponet and S. Artyukhin, First-principles theory of giant Rashba-like spin splitting in bulk GeTe, Phys. Rev. B **98**, 174102 (2018).
[2] D. G. Ovalle and A. Manchon, Spin and orbital-to-charge conversion in noncentrosymmetric materials: Hall versus Rashba-Edelstein effects, Phys. Rev. B **113**, 174427 (2026).