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Supporting Information

Trace of Altermagnetism in GdAlSi Films: Towards the 2D Limit

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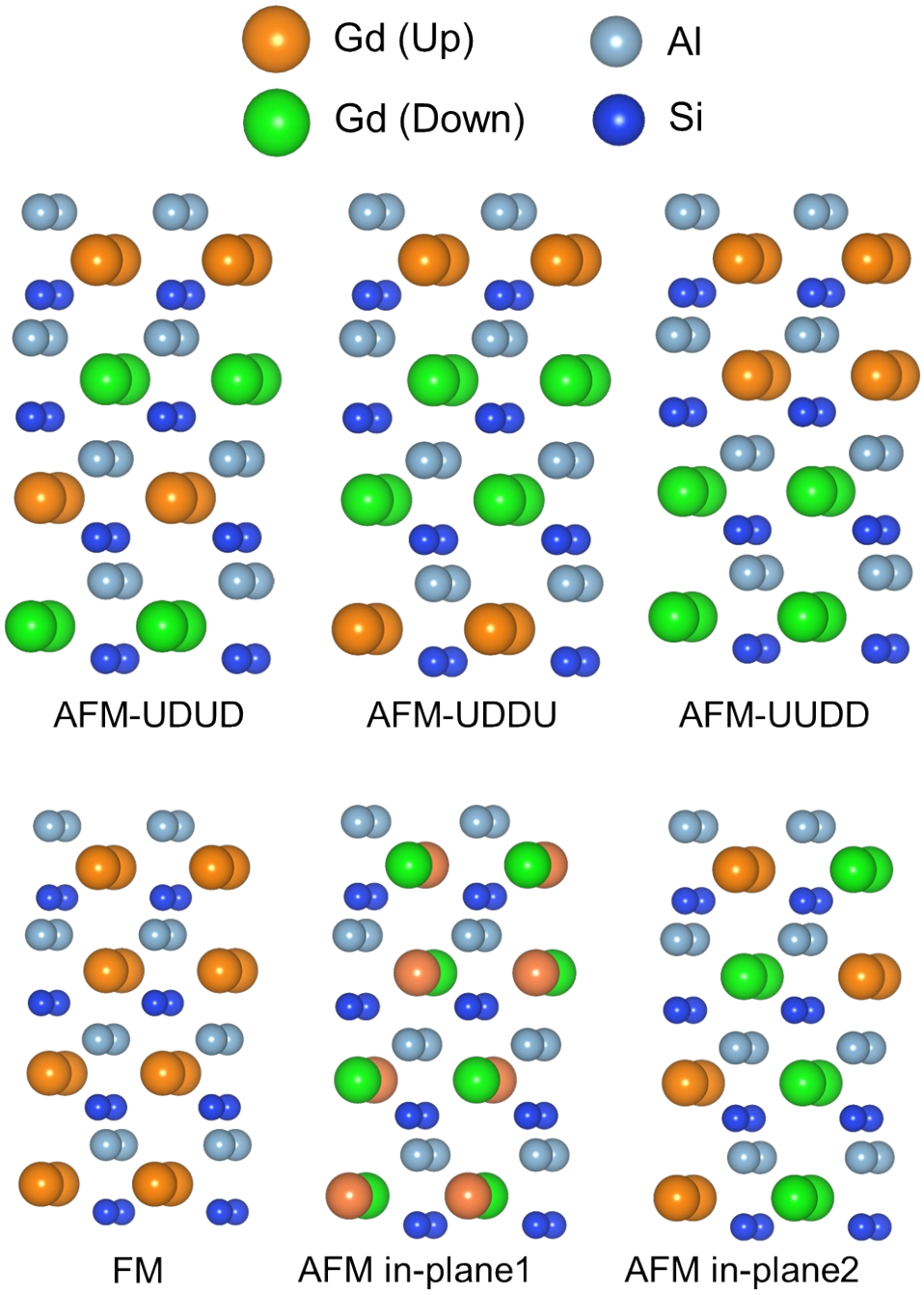

Figure S1. Different magnetic arrangements in 2D GdAlSi films considered in DFT study.

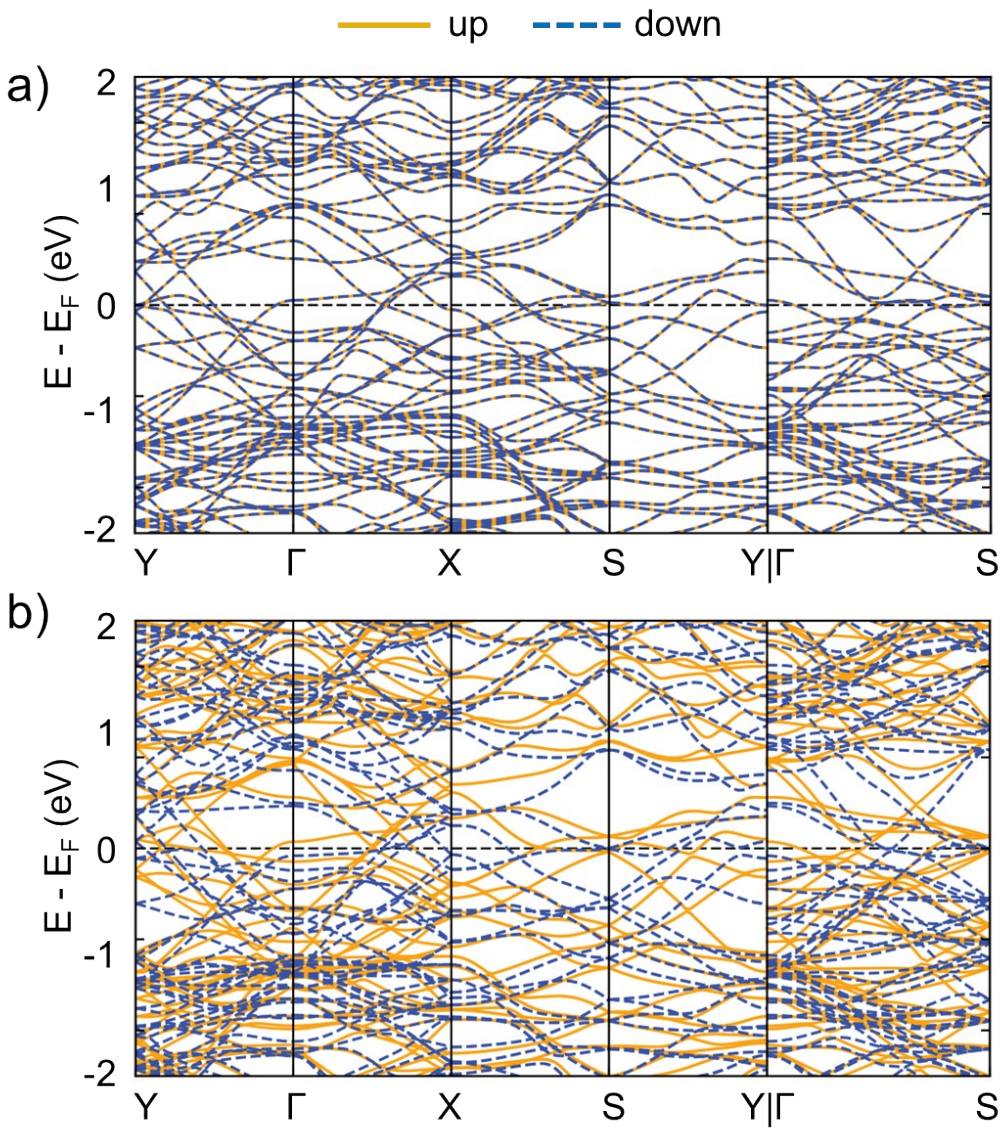

Figure S2. Spin-resolved total band structure of 2×2×1 supercell of 1ML GdAlSi with AlSi termination and (a) AFM in-plane1 or (b) AFM-UDUD magnetic arrangement.

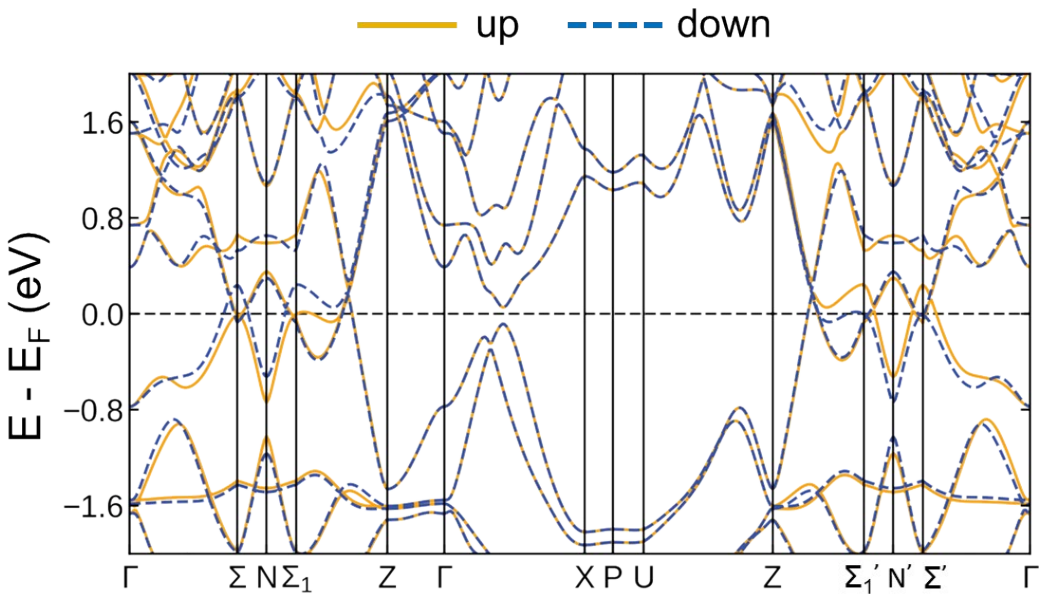

Figure S3. Spin-resolved total band structure of bulk tetra-GdAlSi with AFM-UDUD magnetic arrangement.

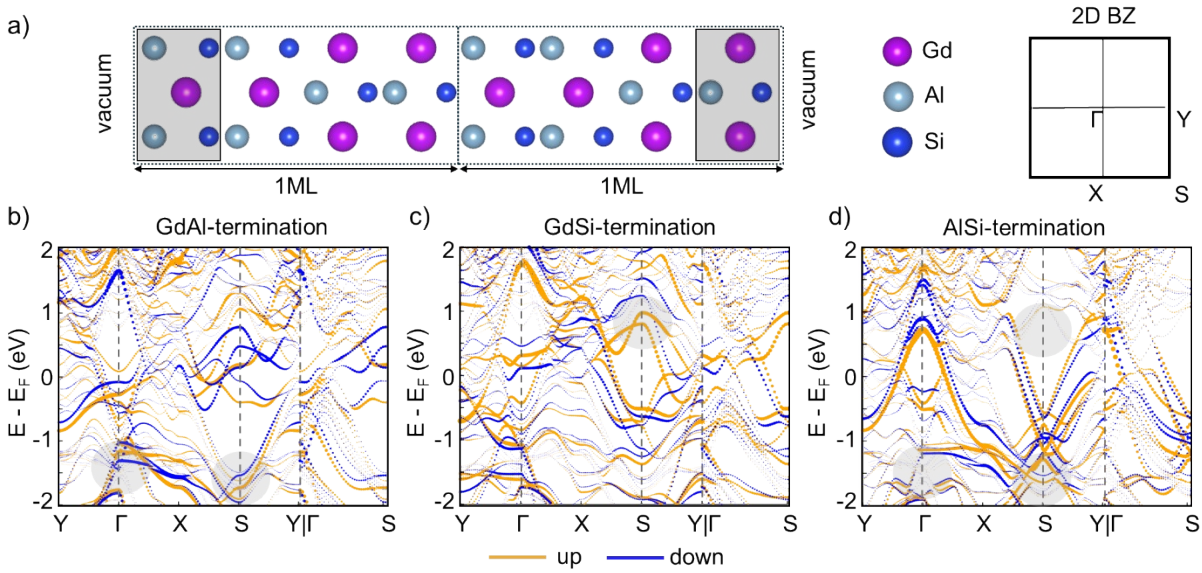

Figure S4. (a) Atomic structure of 1ML (shown by dots) tetra-GdAlSi together with 2D Brillouin zone used. AlSi-termination is shown for illustration purposes. (b-d) Spin-resolved and weighted band structure for different terminations of 1ML film. Bands contributions are shown for *near-surface* six atomic planes as colored by grey in (a). In (b-d) the same regions from **Figure 2** are shown by circles to emphasize the absence of NRSS effect on the surface.

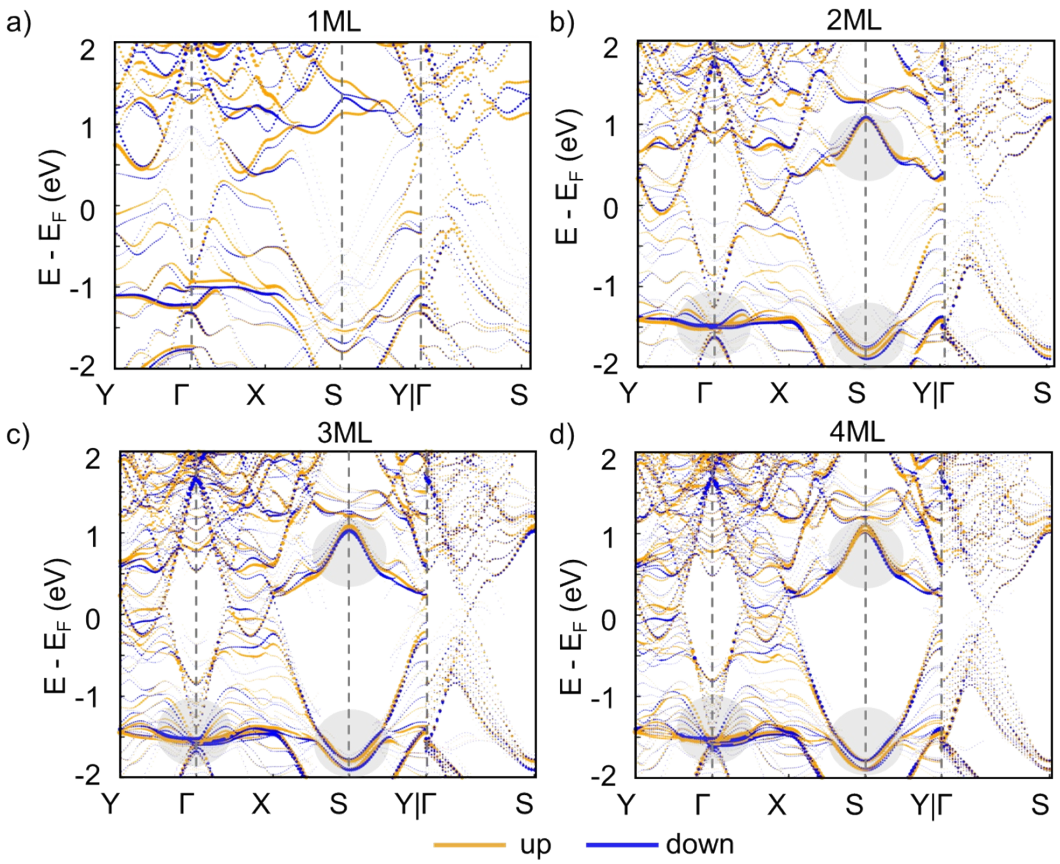

Figure S5. Spin-resolved and weighted band structures for AlSi-terminated GdAlSi film with a thickness of (a) 1ML (b) 2ML (c) 3ML (d) 4ML. Few examples of spin flipping effect near Γ and S points are colored by grey circles. Everywhere weighted bands contributions are shown for center “bulk-like” atoms.

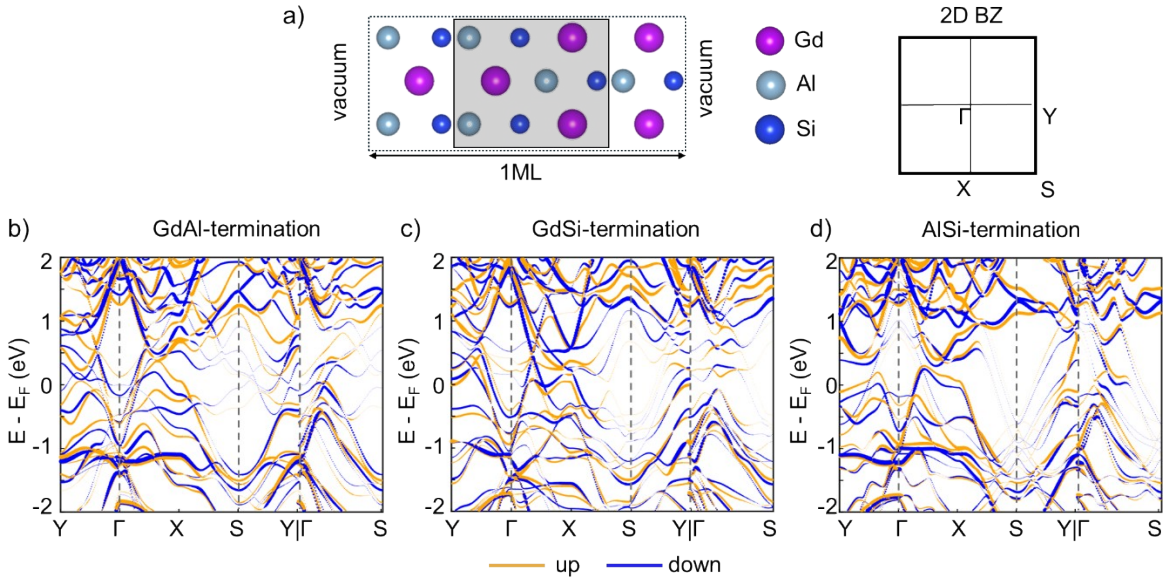

Figure S6. (a) Atomic structure of 1ML (shown by dots) tetra-GdAlSi together with 2D Brillouin zone used. AlSi-termination is shown for illustration purpose. (b-d) Spin-resolved and weighted band structure for different terminations of 1ML film. Bands contributions are shown for central six atomic planes as colored by grey in (a).

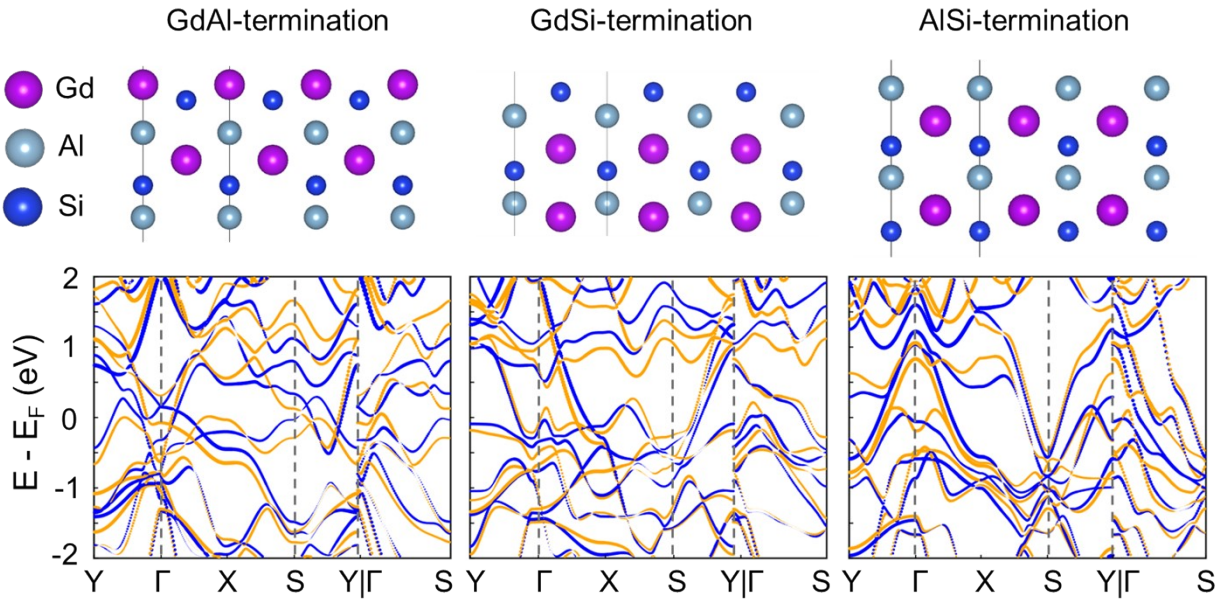

Figure S7. Atomic structure of ½ML GdAlSi with different termination and corresponding spin-resolved total band structure.