

Spontaneous and reversible spin-splitting in ferroelectric A-type antiferromagnetism

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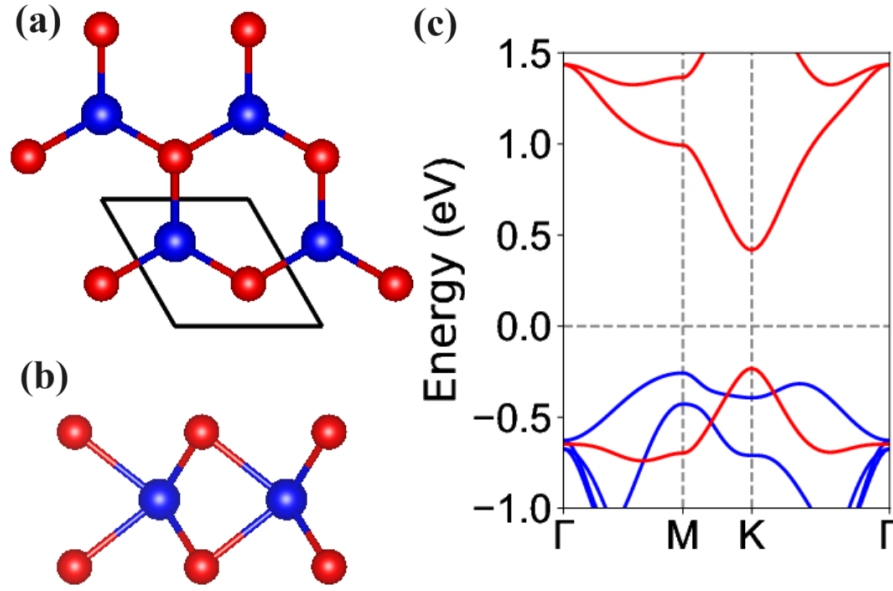


FIG. S1. (Color online) The crystal structures [top (a) and side (b) views] and energy band structures (c) of RuBr_2 monolayer. In (a) and (c), the red and blue balls represent the Br and Ru atoms, respectively. In (c), the spin-up and spin-down channels are depicted in blue and red.

```

AB-bilayer
1.0000000000000000
 3.7201954241226112  0.0000000000000000  0.0000000000000000
-1.8600977120613065  3.2217837443291479  0.0000000000000000
 0.0000000000000000  0.0000000000000000  30.6650009154999985
 Ru  Br
  2   4
Direct
 0.3333333510000003  0.6666667029999971  0.3360424894657825
 0.6666667080000011  0.3333333510000003  0.5518023240120229
 0.6666667080000011  0.3333333510000003  0.2794211628649776
 0.6666667080000011  0.3333333510000003  0.3924082600640446
 0.0000000000000000  0.0000000000000000  0.4954233696609478
 0.0000000000000000  0.0000000000000000  0.6084124249322329
monolayer
1.0000000000000000
 3.7547373710534355  0.000000000110835  0.0000000000000000
-1.8773686854584519  3.2516979478349852  0.0000000000000000
 0.0000000000000000  0.0000000000000000  24.6439990997000002
 Ru  Br
  1   2
Direct
 0.333329860000021  0.6666669849999991  0.0000000000000000
 0.6666669849999991  0.333329860000021  0.9300872592475296
 0.6666669849999991  0.333329860000021  0.0699127407524706

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FIG. S2. (Color online) The POSCAR of RuBr_2 bilayer and monolayer.

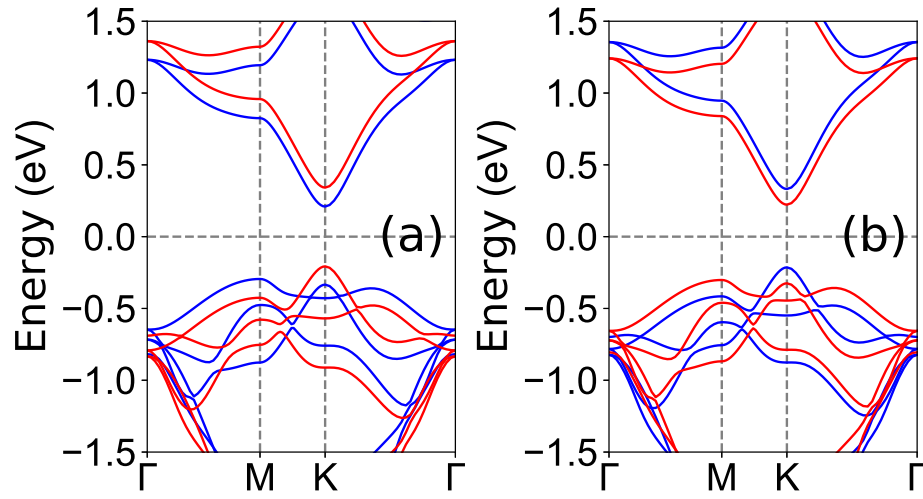


FIG. S3. (Color online) The energy band structures of AB-stacked RuBr₂ bilayer with electric field +0.10 V/Å (a) and -0.10 V/Å (b). The spin-up and spin-down channels are depicted in blue and red.

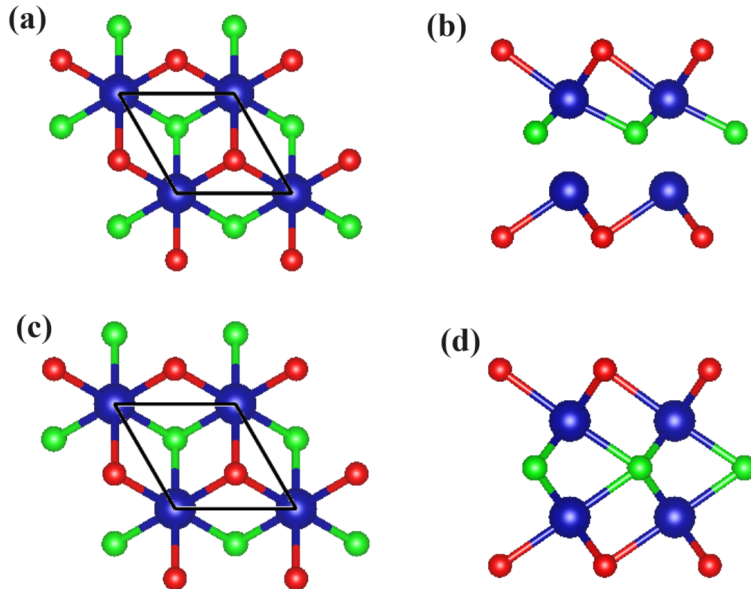


FIG. S4. (Color online) The crystal structures [top (a,c) and side (b,d) views] of Co₂CF₂ monolayer with H' (a,b) and H (c,d) phases. The red, blue and green balls represent the F, Co and C atoms, respectively.

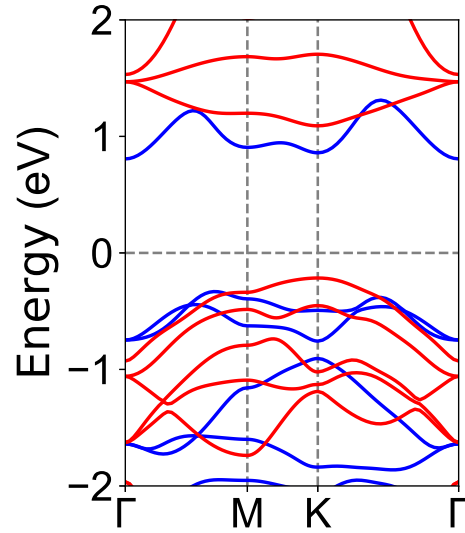


FIG. S5. (Color online) The energy band structures of Co_2CF_2 monolayer with H' phase. The spin-up and spin-down channels are depicted in blue and red.

```

AC
  1.00000000000000
  2.8688034880388176  0.0000000000000000  0.0000000000000000
 -1.4344017440688628  2.4844566990685766  0.0000000000000000
  0.0000000000000000  0.0000000000000000  32.2830009460000014
  C      F      Co
  2      4      4
Direct
  0.333333380000028  0.666666675000019  0.5858887893138416
  0.0000000000000000  0.0000000000000000  0.8111833089361653
  0.333333380000028  0.666666675000019  0.7306364070679621
  0.333333380000028  0.666666675000019  0.8751821804037121
  0.666666690000014  0.333333380000028  0.5052370144777427
  0.666666690000014  0.333333380000028  0.6501866095546376
  0.666666690000014  0.333333380000028  0.7662186000198830
  0.666666690000014  0.333333380000028  0.8372825761417388
  0.0000000000000000  0.0000000000000000  0.5409922390746544
  0.0000000000000000  0.0000000000000000  0.6121823600096548
.....
AB
  1.00000000000000
  2.8688034880388176  0.0000000000000000  0.0000000000000000
 -1.4344017440688628  2.4844566990685766  0.0000000000000000
  0.0000000000000000  0.0000000000000000  32.2830009460000014
  C      F      Co
  2      4      4
Direct
  0.333333380000028  0.666666675000019  0.4141100000000009
  0.0000000000000000  0.0000000000000000  0.1888199999999998
  0.333333380000028  0.666666675000019  0.2693599999999998
  0.333333380000028  0.666666675000019  0.1248199999999997
  0.666666690000014  0.333333380000028  0.4947599999999994
  0.666666690000014  0.333333380000028  0.3498099999999998
  0.666666690000014  0.333333380000028  0.2337800000000030
  0.666666690000014  0.333333380000028  0.1627200000000002
  0.0000000000000000  0.0000000000000000  0.4590099999999993
  0.0000000000000000  0.0000000000000000  0.3878199999999997

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FIG. S6. (Color online) The POSCAR of $\text{H}'\text{-Co}_2\text{CF}_2$ bilayer systems with AC and AB patterns.

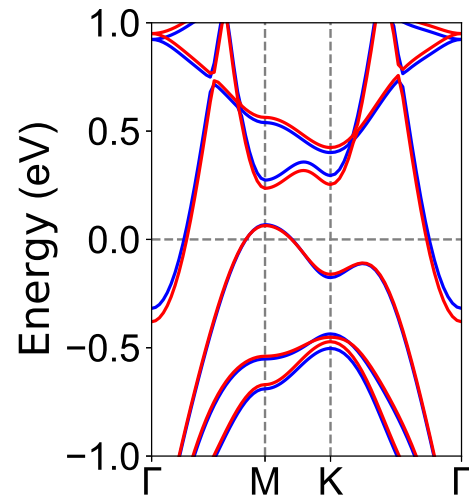


FIG. S7. (Color online) The energy band structures of bilayer Co_2CF_2 , where the C atoms of AC pattern are artificially moved on the central horizontal plane of Co dimers. The spin-up and spin-down channels are depicted in blue and red.