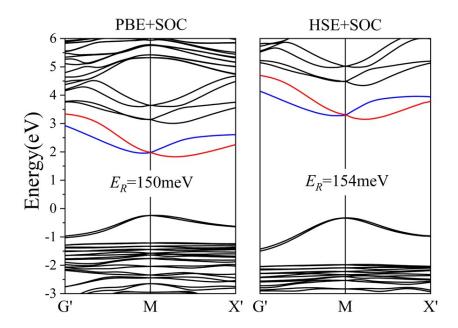
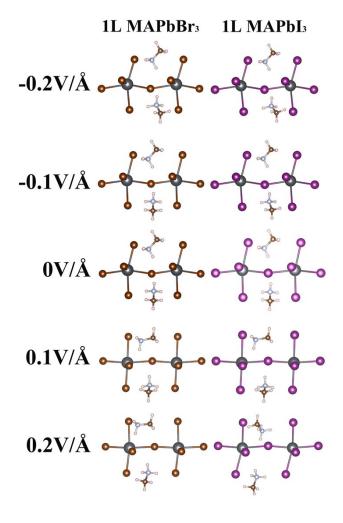
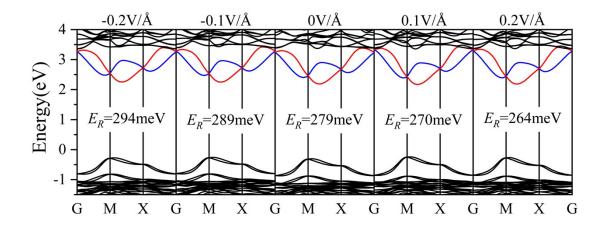
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SFig.1 The energy bands of 1L MAPbBr<sub>3</sub> calculated by PBE+SOC and HSE+SOC methods.





SFig.3 The energy bands of (PEA)<sub>2</sub>PbBr<sub>3</sub> under EEF of -0.2 V/Å to 0.2V/Å. The split spin states of CBM have been highlighted by blue and red colors respectively.