Supplementary Information (SI) for Physical Chemistry Chemical Physics.

An *ab initio* study of the rovibronic spectrum of CH

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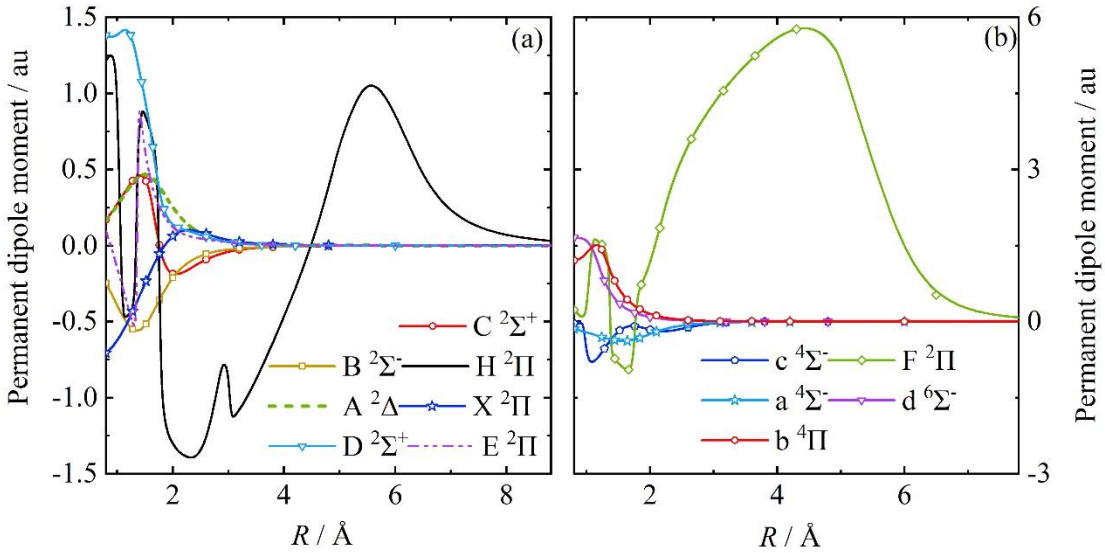

Figure S1: Permanent dipole moments for the electronic states of CH computed in this work.

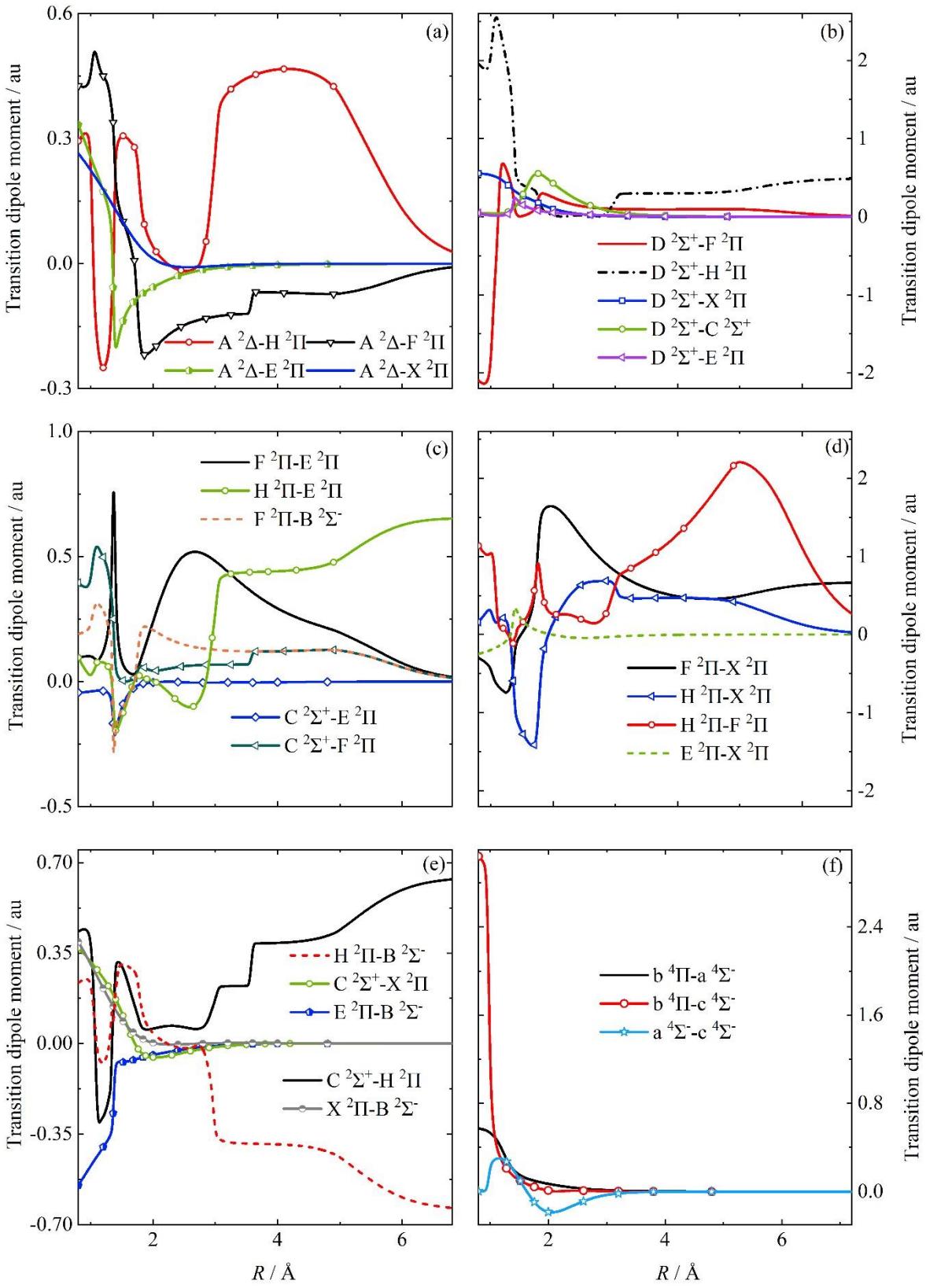

Figure S2: Transition dipole moments of CH molecule in the adiabatic representations.

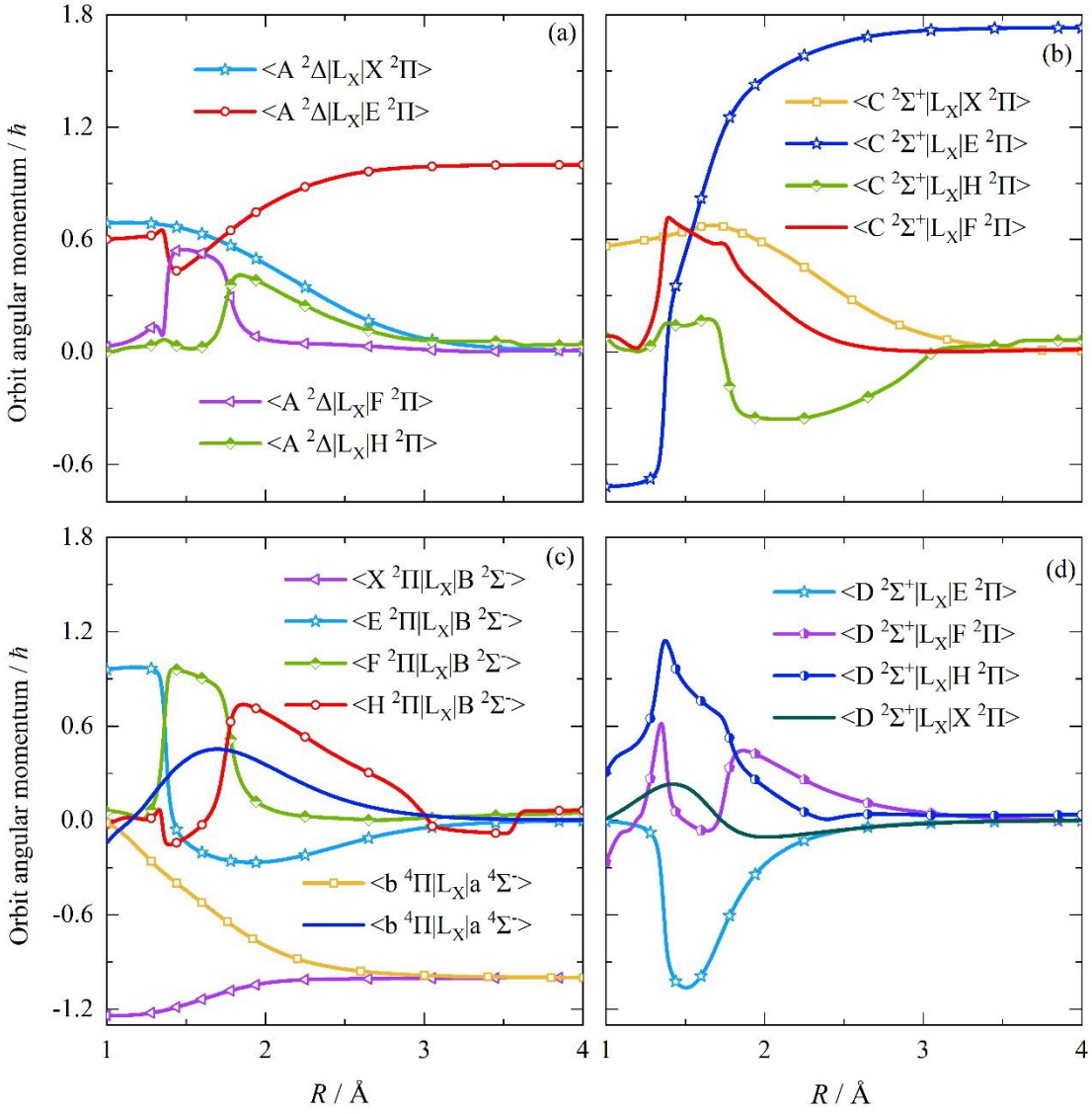

Figure S3: *Ab initio* electronic angular moment curves of CH molecule in the adiabatic representations.

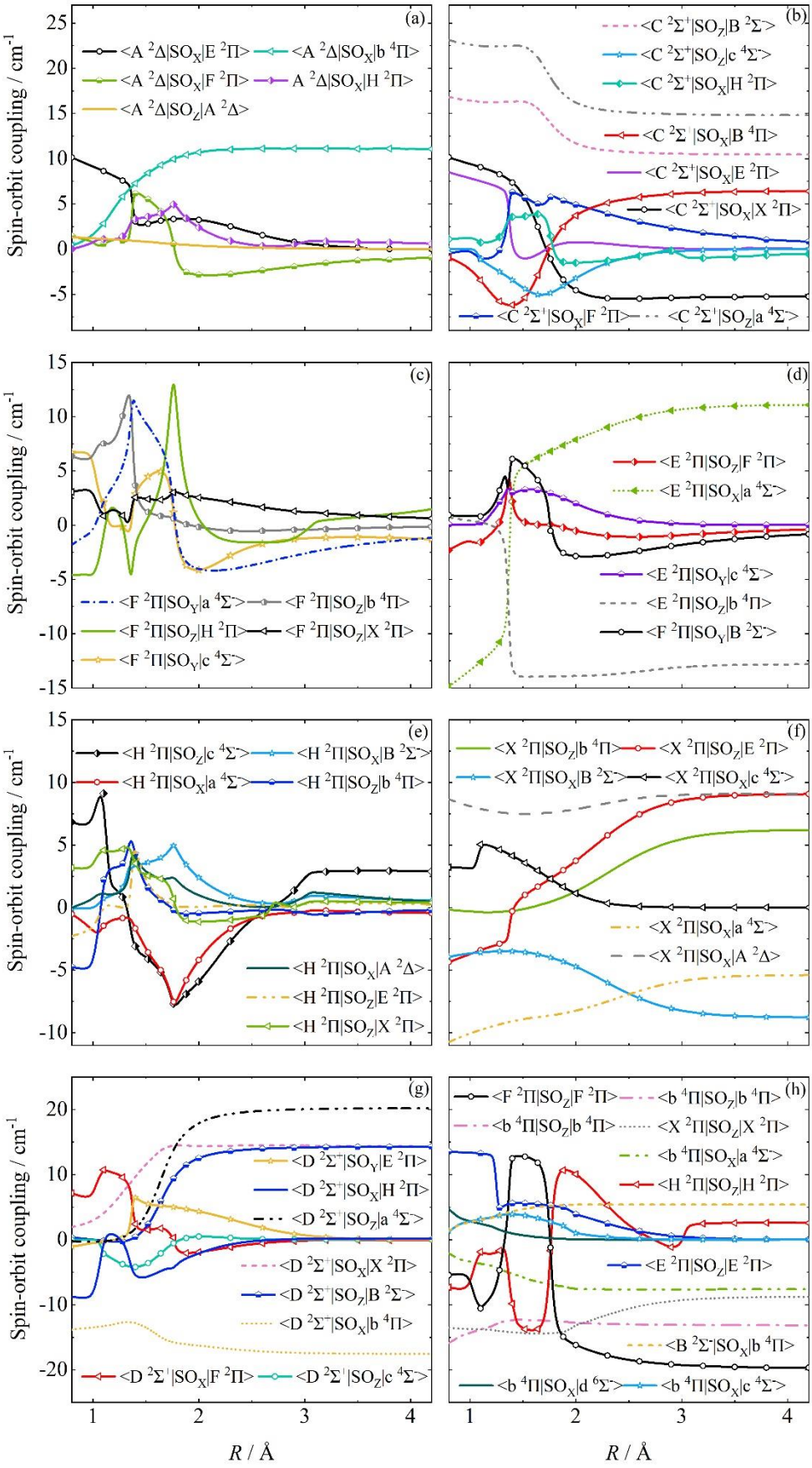

Figure S4: *Ab initio* spin-orbit MOLRPO matrix elements of CH molecule in the adiabatic

representations.

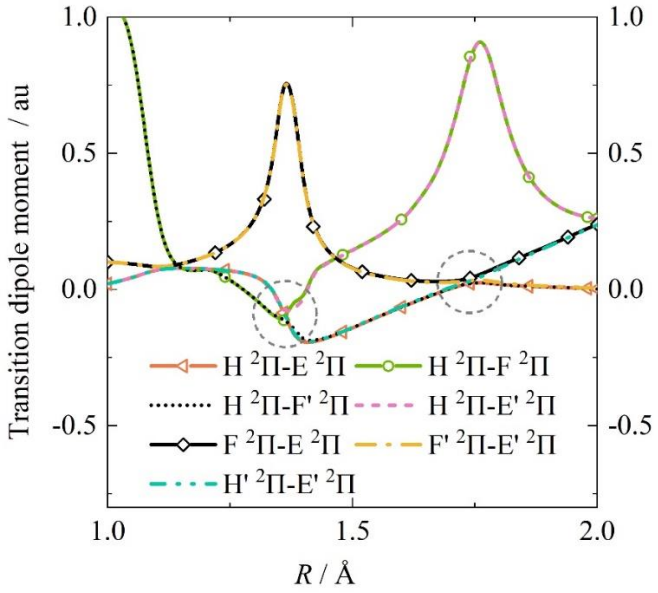

Figure S5: TDMs for the H $^2\Pi$-E $^2\Pi$, H $^2\Pi$-F $^2\Pi$, and F $^2\Pi$-E $^2\Pi$ transitions.

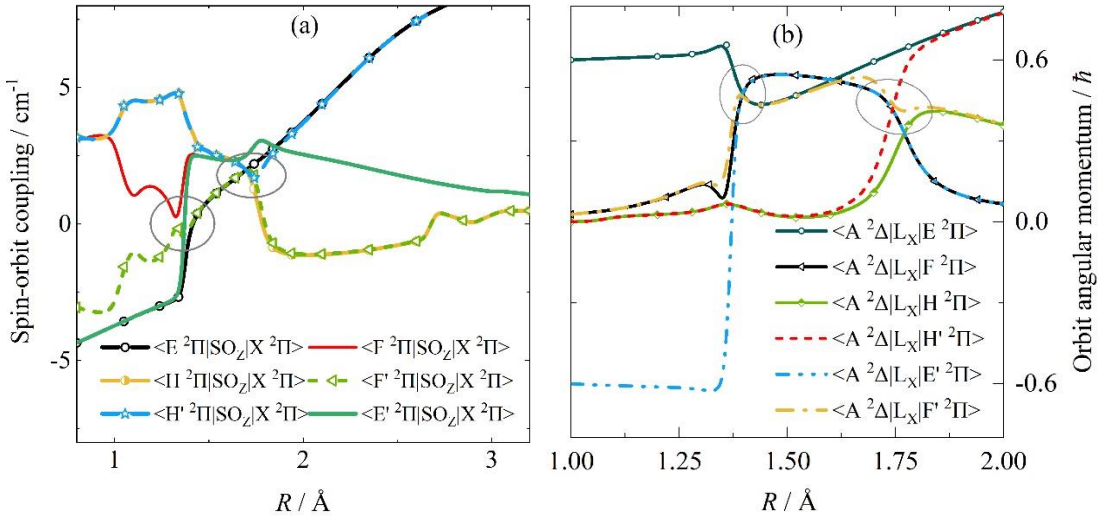

Figure S6: Illustrations of the diabatic and adiabatic representations of (a) SOCs for the H $^2\Pi$-X $^2\Pi$, F $^2\Pi$-X $^2\Pi$ and E $^2\Pi$-X $^2\Pi$ transitions as well as (b) EMACs for the A $^2\Delta$-E $^2\Pi$, A $^2\Delta$-F $^2\Pi$, and A $^2\Delta$-H $^2\Pi$ transitions.

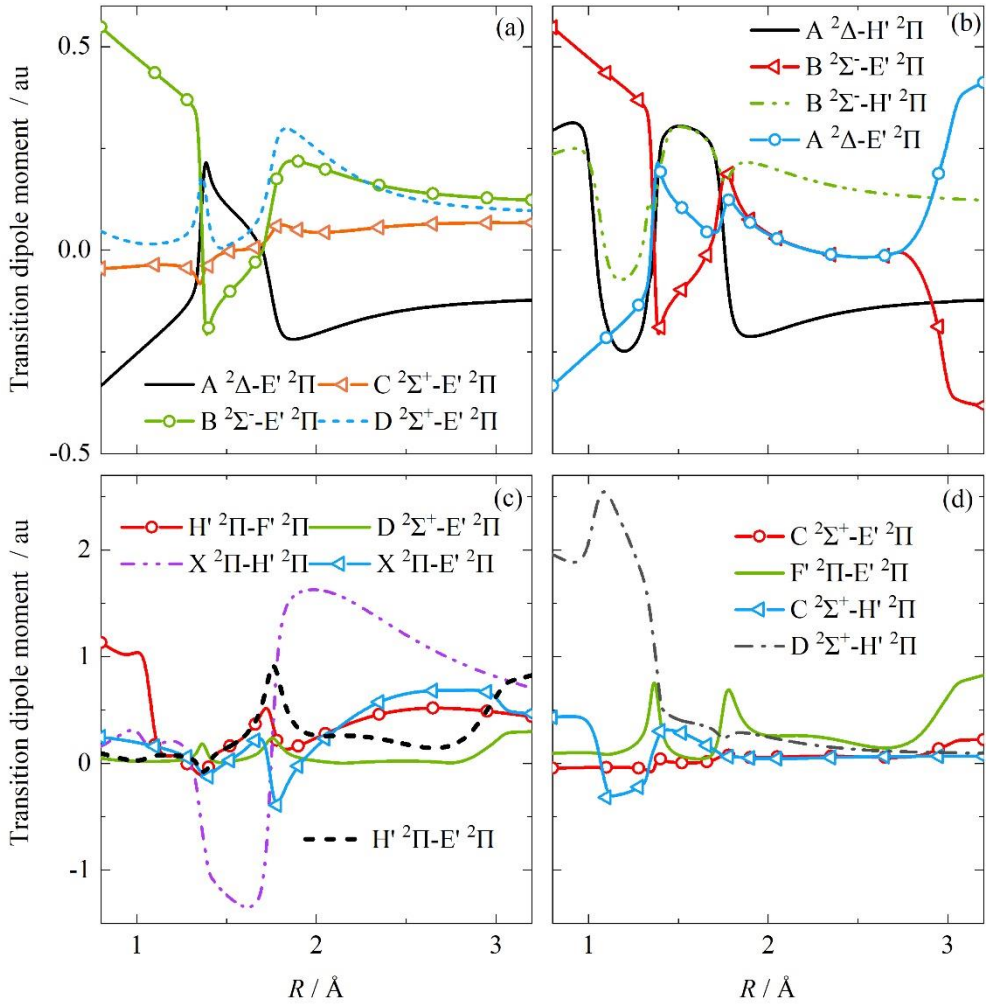

Figure S7: Transition dipole moments of CH molecule in the diabatic representations.

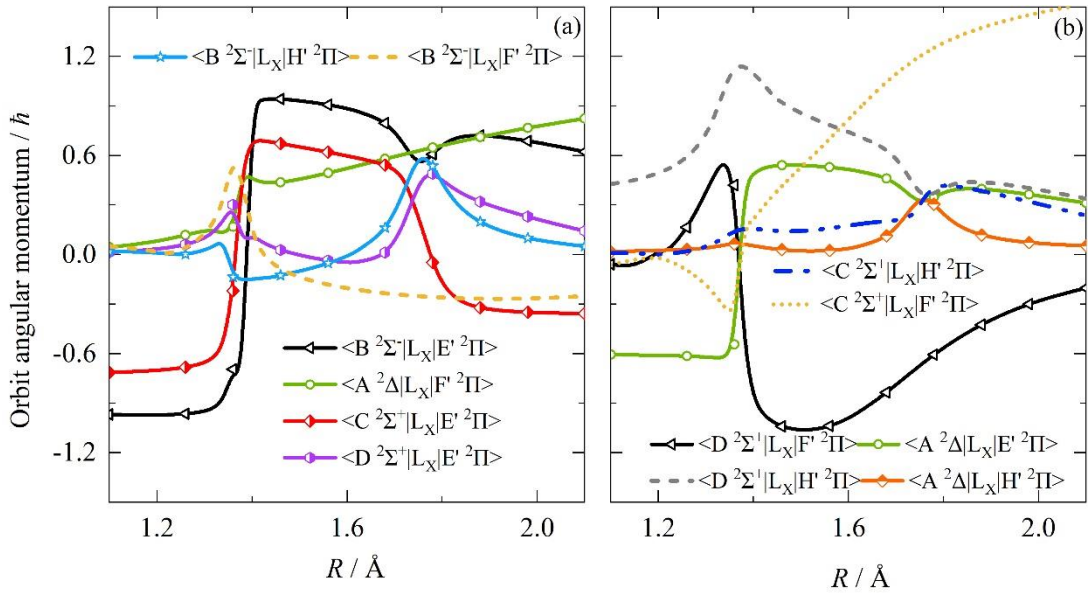

Figure S8: Electronic angular moment curves of CH molecule in the diabatic representations.

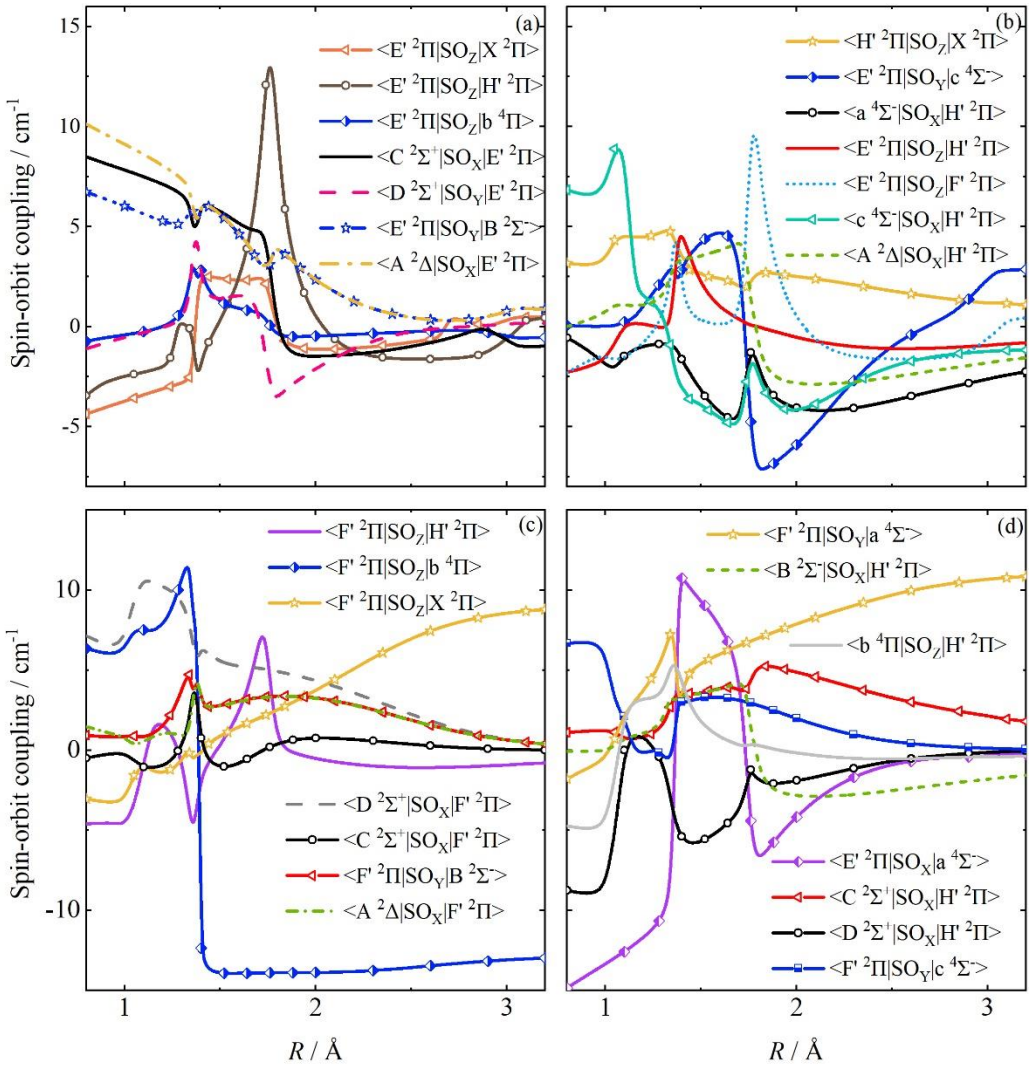

Figure S9: Spin-orbit coupling curves of CH molecule in the diabatic representations.