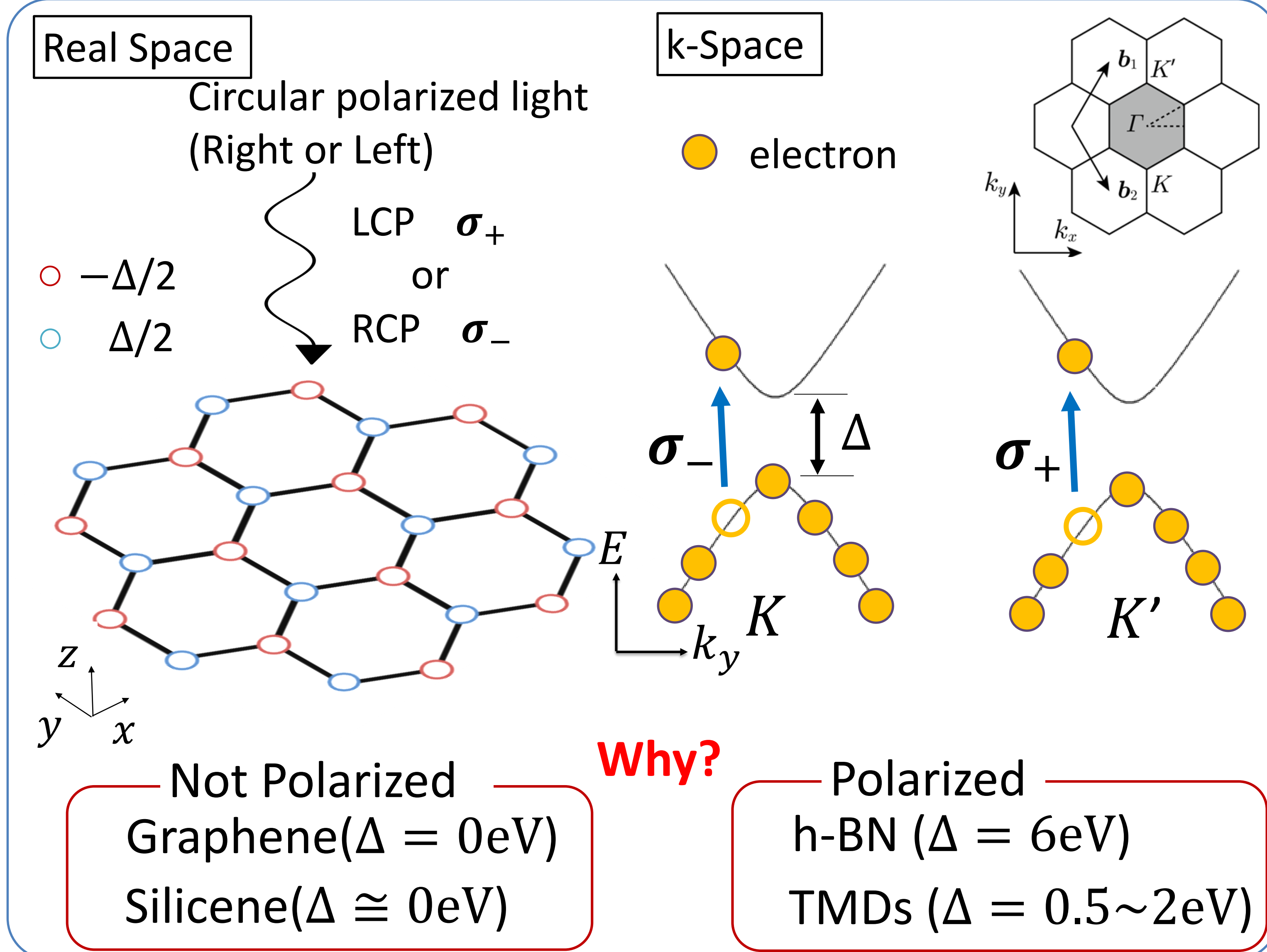


# Valley polarization in layer material by light absorption



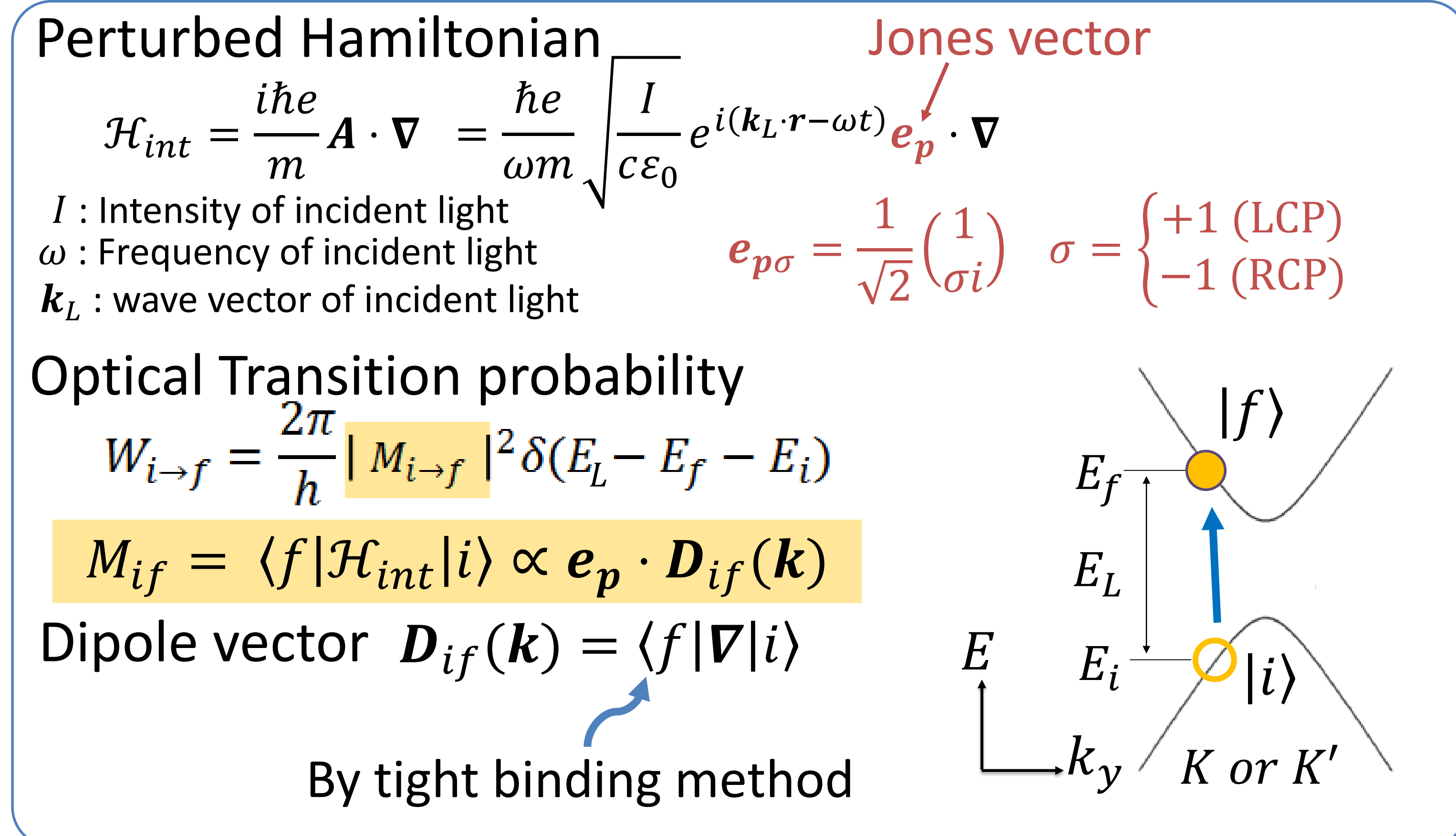
## 1 What is optical valley polarization?



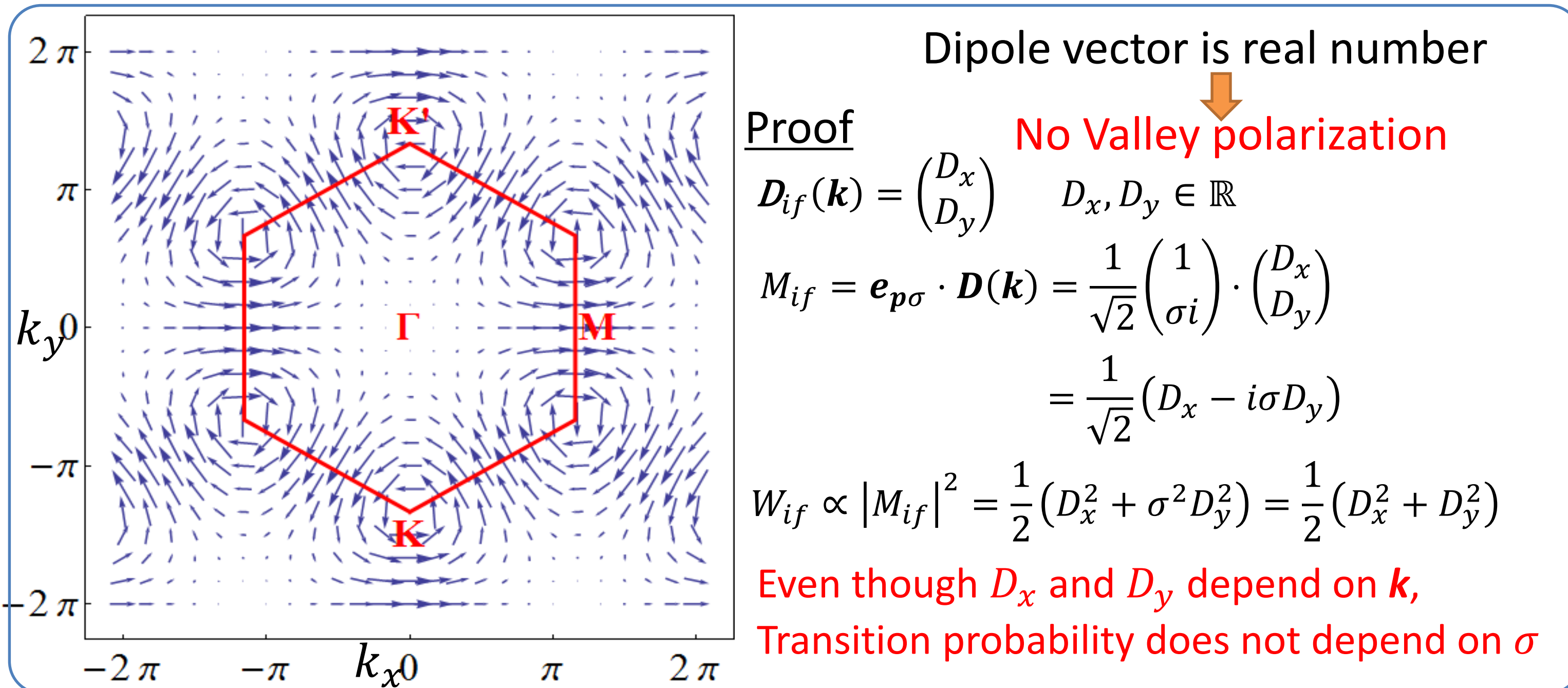
## 2 What I want to know

1. The origin of valley polarization
2. Role of the energy band gap and Spin orbit coupling (SOC)

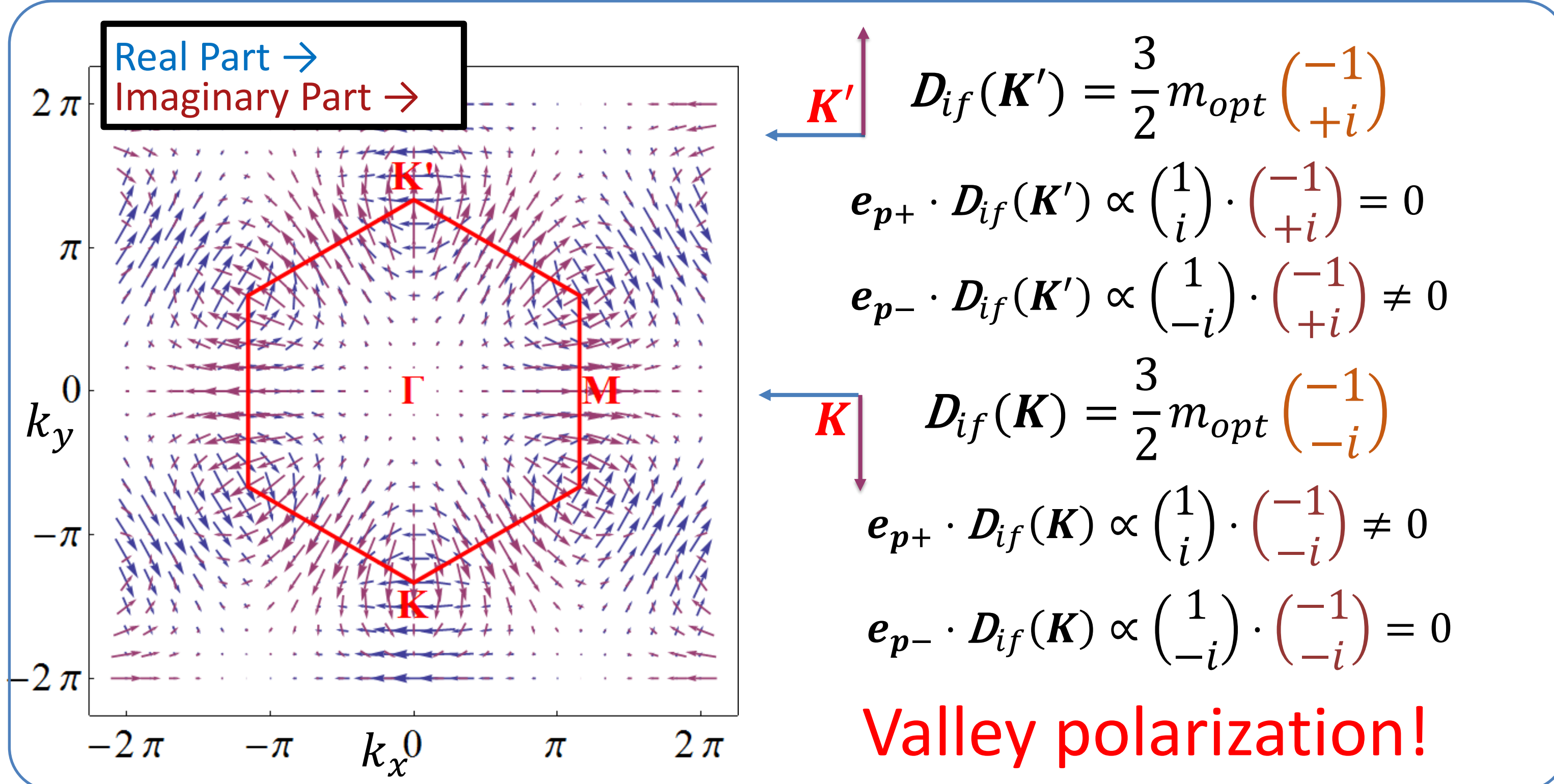
## 3 How to calculate



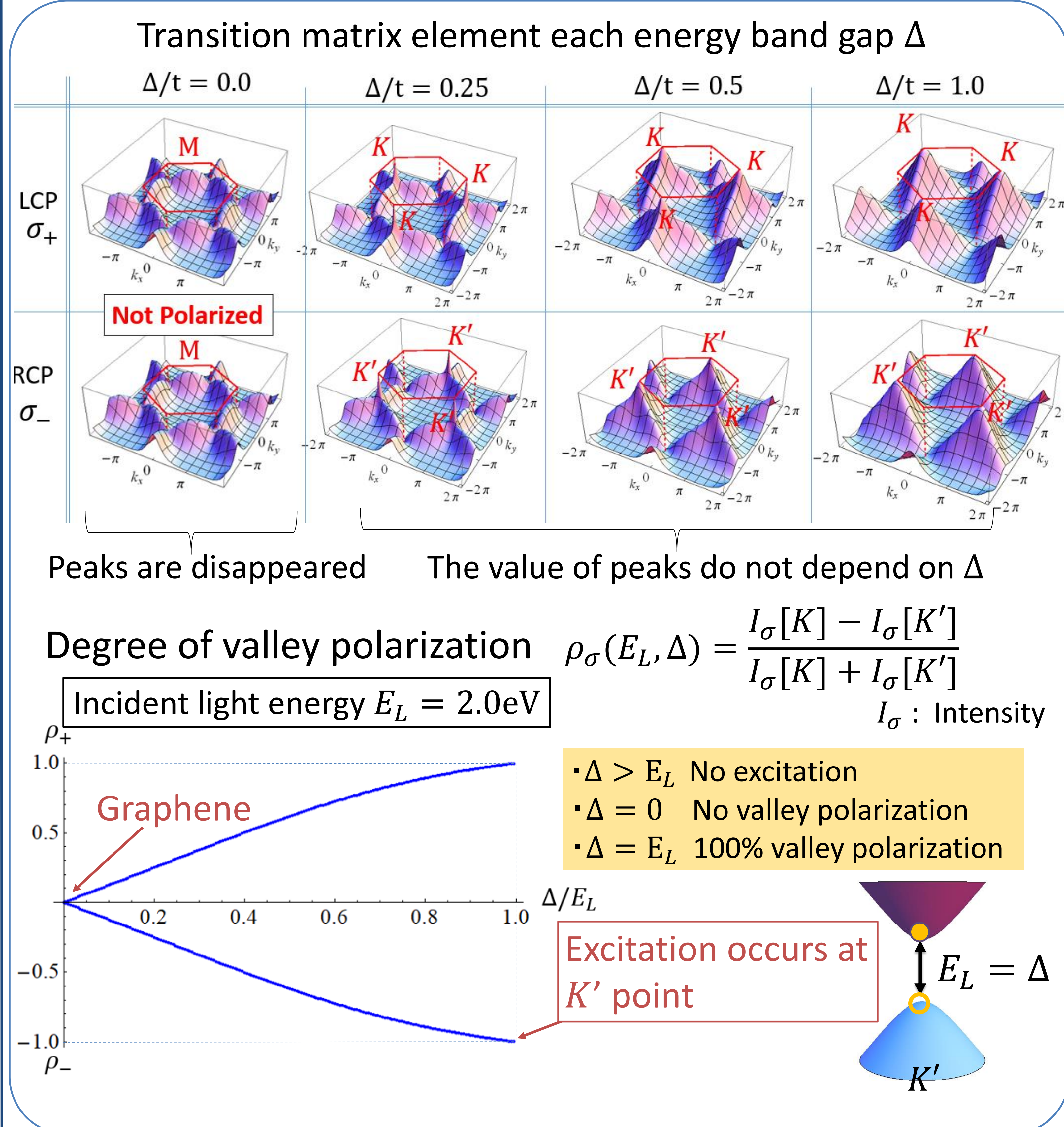
### 4-1 Dipole vector of Graphene ( $\Delta = 0$ )



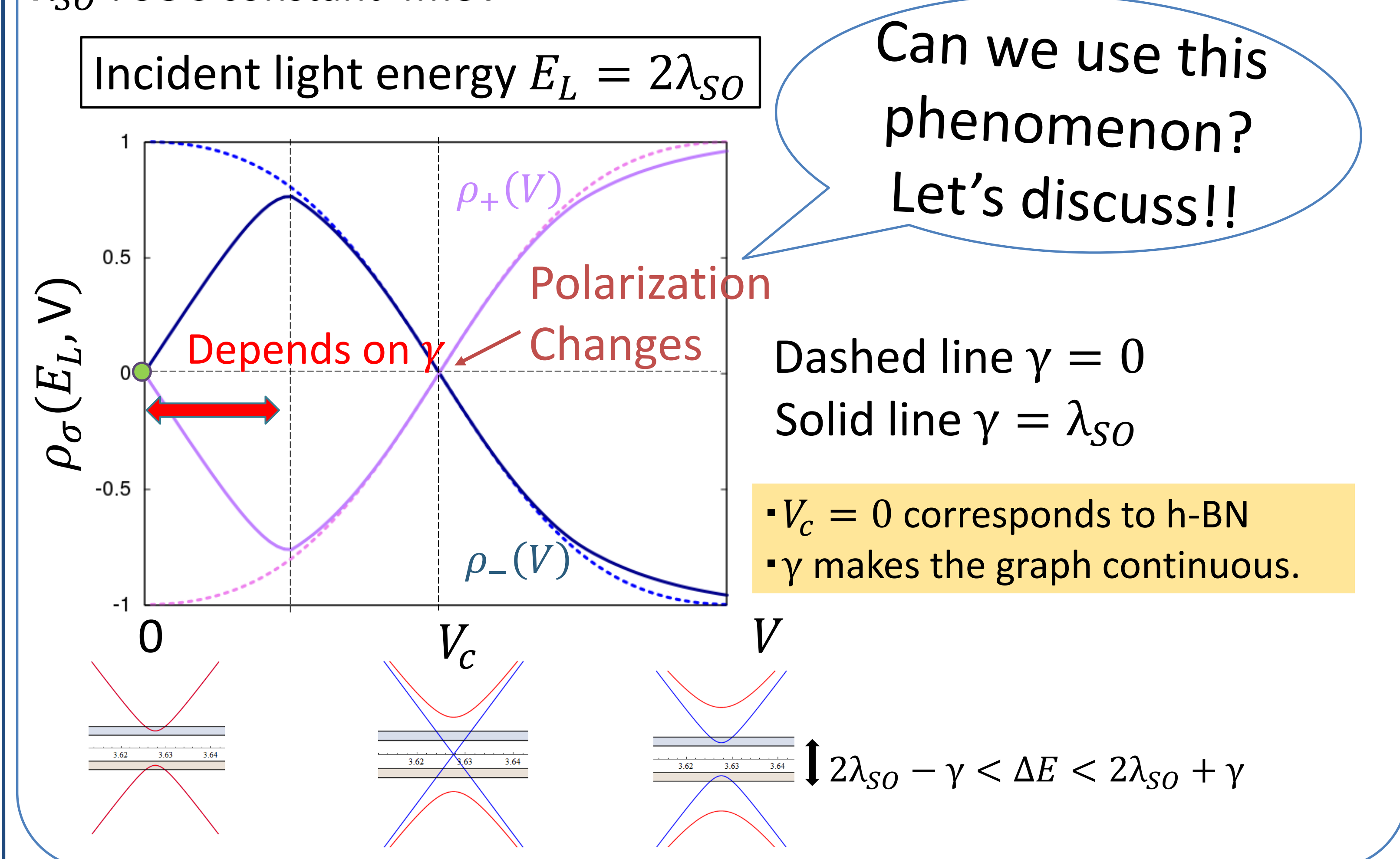
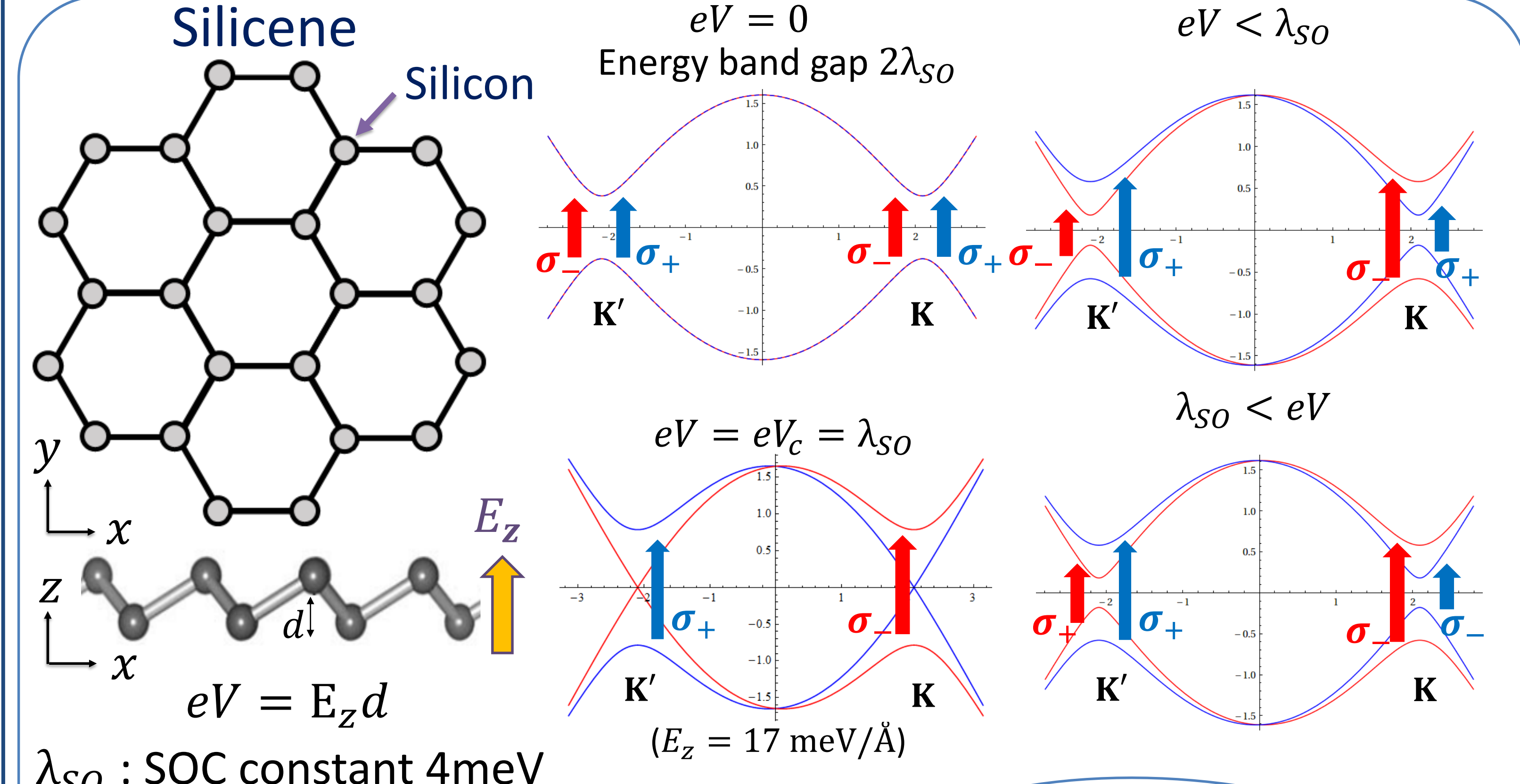
### 4-2 Dipole vector of h-BN ( $\Delta \neq 0$ )



## 5 Valley polarization depending on $\Delta$



## 6 How can we control energy band gap?



## 7 Conclusion

- System has valley polarization when real and imaginary part of dipole vector are perpendicular.
- Band inversion makes valley polarization flip