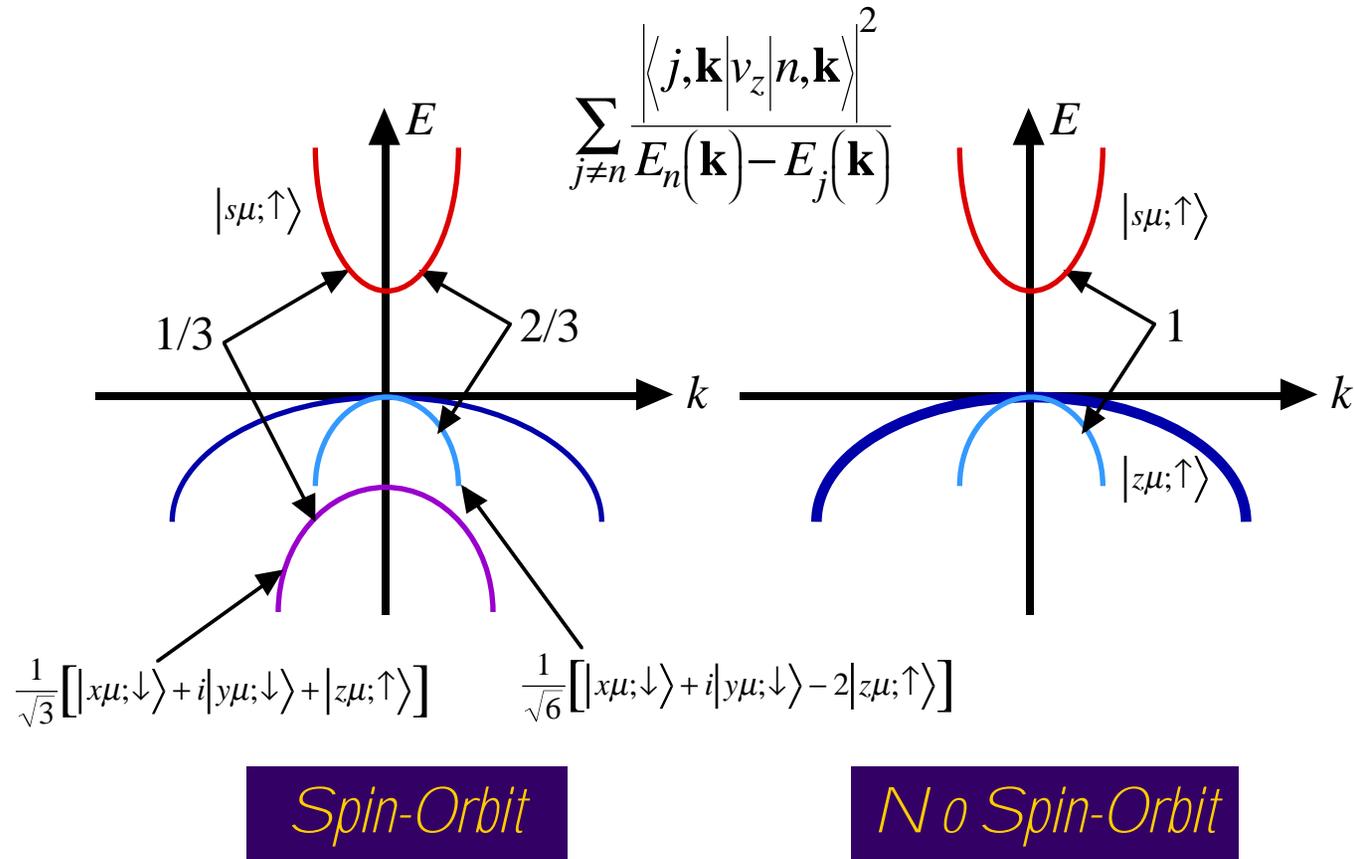


Choice and Parametrization of Empirical Tight-Binding Models

Timothy B. Boykin
The University of Alabama in Huntsville

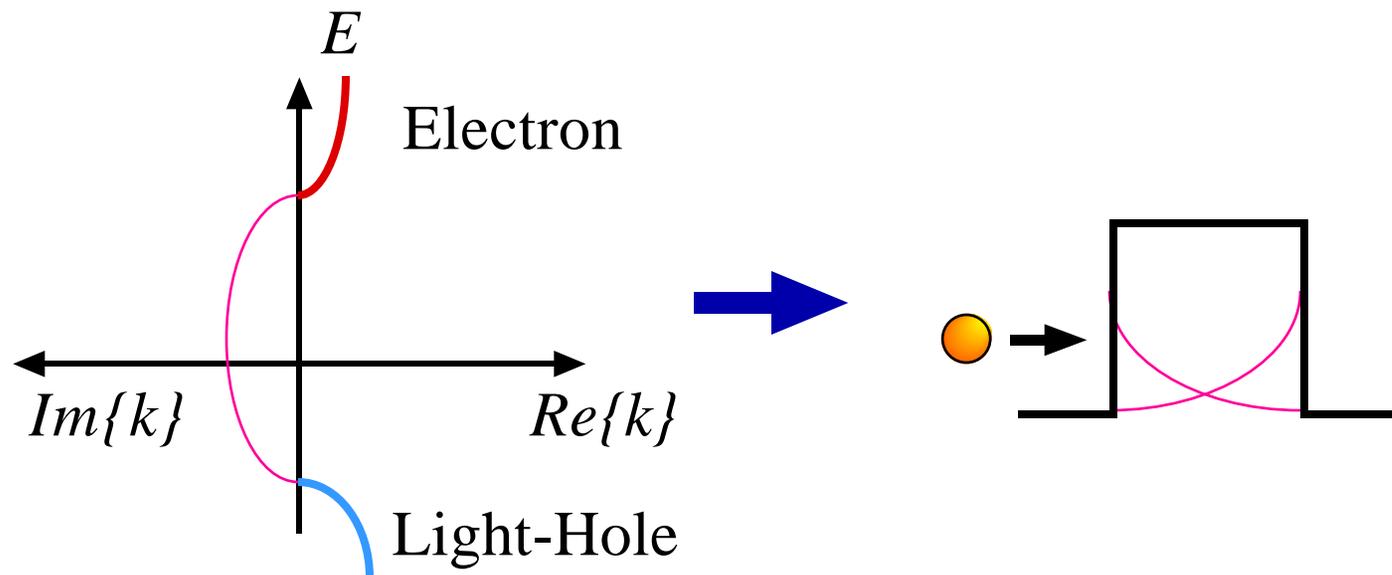
Gerhard Klimeck
Jet Propulsion Laboratory

Interband Velocity Matrix Elements

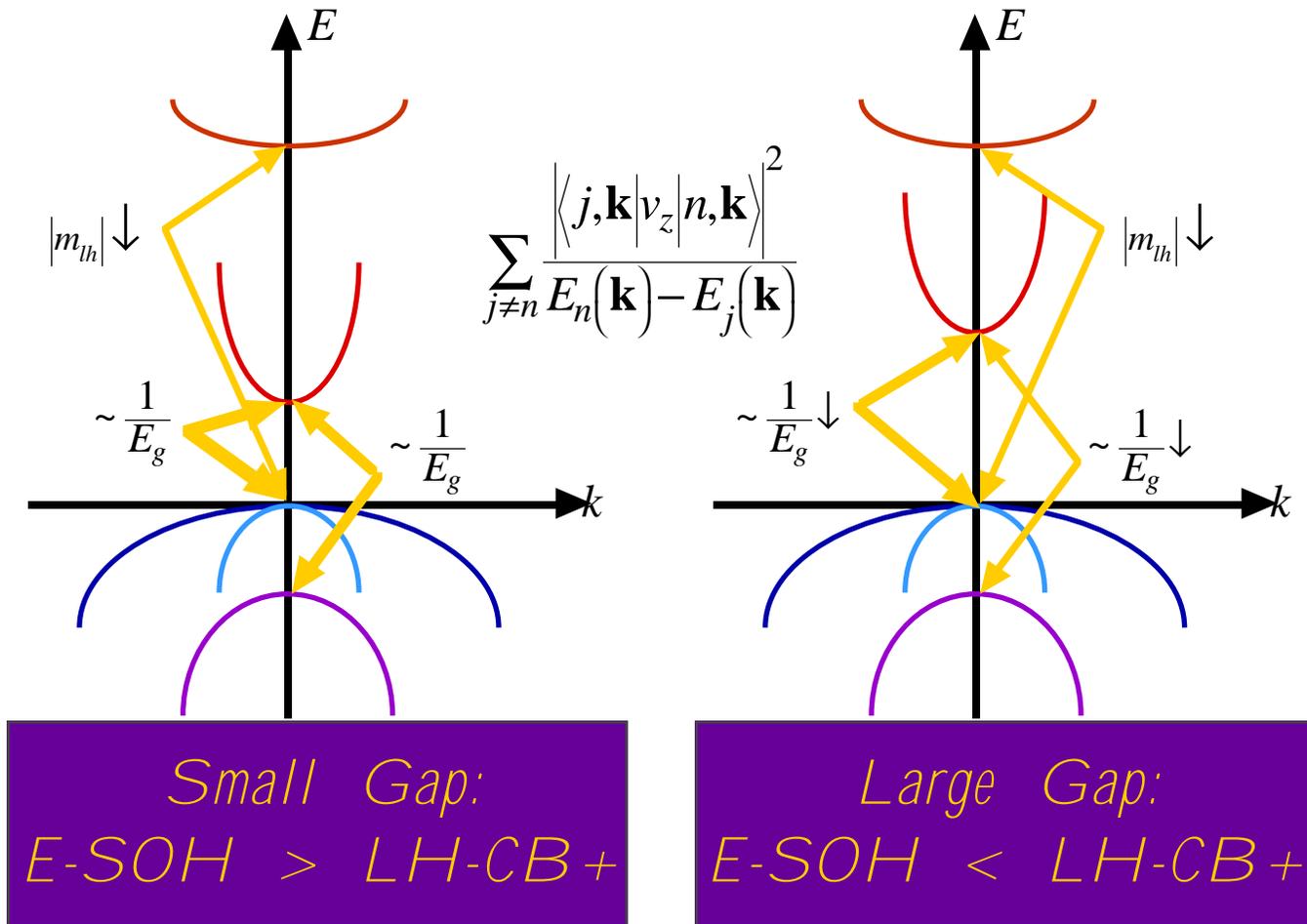


Fitting Both m_e and m_{lh}

- These masses affect imaginary-band linking CB-LH
- Imaginary-band \Rightarrow *attenuation*
 - Important for confinement of Γ -valley QW states



Electron & Light-Hole Masses: Large & Small Gap Materials



Control of Valence-Band Warping

sp^3s^* Models

Nearest-Neighbor

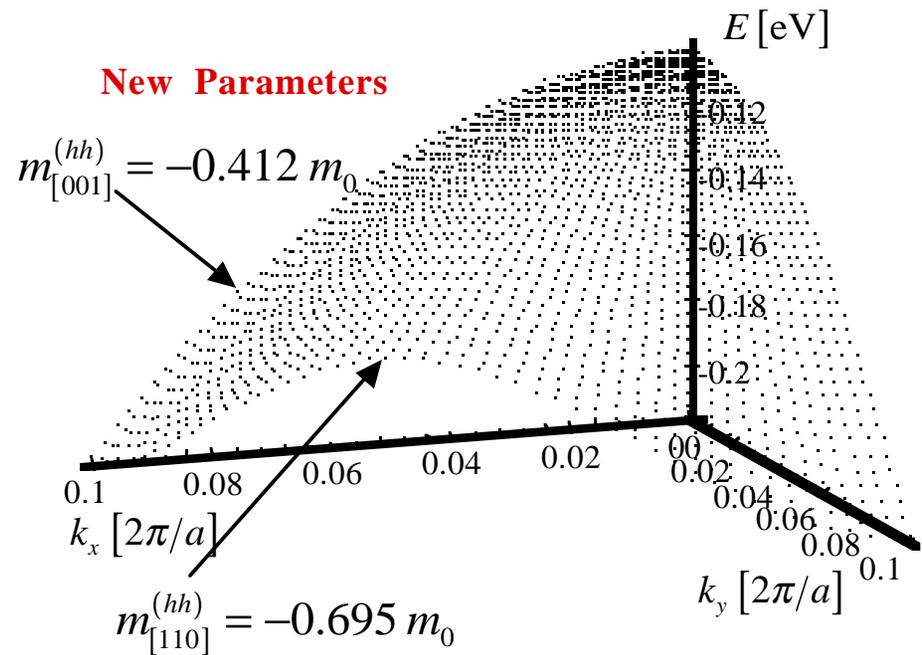
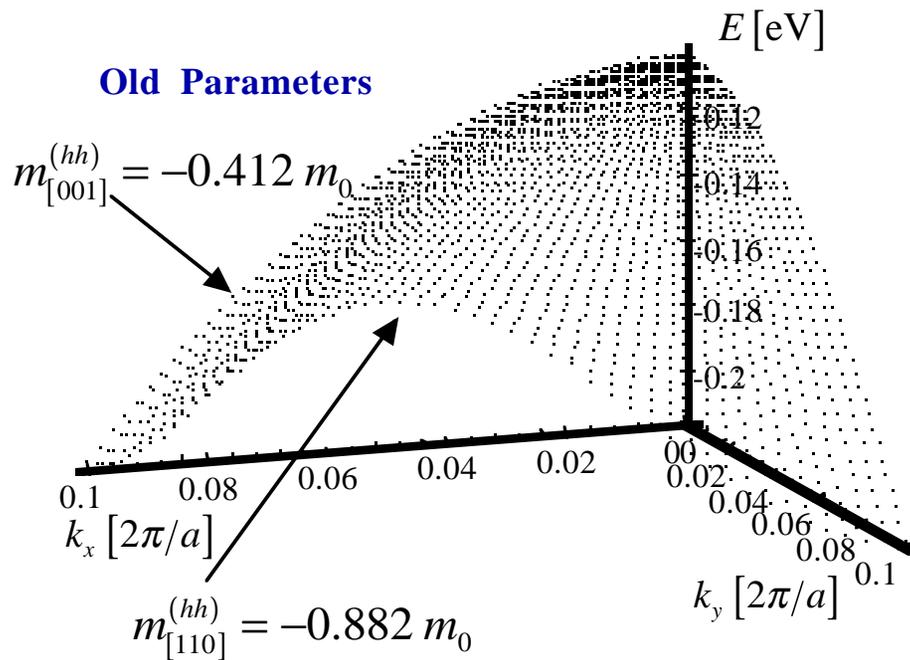
- Fix [001]-hole masses
 $\Rightarrow V_{x,x}, V_{x,y}$ fixed
- *No new parameters* enter [110]-, [111]-hole masses
- [110]-masses *functions* of [001]-, [111]-masses
- [110]-, [111]-hole masses *completely determined*

Second-Near Neighbor

- Fix [001]-hole masses
 $\Rightarrow V_{x,x}, V_{x,y}$ fixed
- *Two new parameters* in [110]-, [111]-hole masses
- [110]-masses *functions* of [001]-, [111]- masses
- *Freedom remains* to fit *one* [111]-hole mass

Valence-Band Warping GaAs

Second-Near Neighbor sp^3s^*



GaAs/AlAs 20 ML QW

