



[Previous abstract](#) | [Graphical version](#) | [Text version](#) | [Next abstract](#)

Session ZC16 - Mobility in Quantum Wells.

ORAL session, Friday afternoon, March 26

Room 264W, GWCC

[ZC16.03] Valence-band warping in tight-binding models and its effect on heterostructure electronic states

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The spin-orbit sp^3s^* model is widely believed able to accurately reproduce the valence bands of most III-V and Group-IV semiconductors, essential for modeling the in-plane dispersion of valence- and inter-band quantum heterostructures. To check this belief, we derive exact, analytic formulas for the [110] and [111] light- and heavy-hole masses in the spin-orbit second-near neighbor sp^3s^* model. We find that the second-near neighbor model offers much more flexibility for fitting the valence-band masses than does the nearest-neighbor model. We demonstrate the importance of properly reproducing the valence-band warping by studying the in-plane dispersion of a GaAs/AlAs quantum well.

■ **Part Z of program listing**