tion band minimum, CB ... in Fig. 1a) or convex ...

... the valence band maximum, VB ...

Such structures can be either ... supported ... tures are coupled to another material with a similar ... derlying bulk electronic structure, e.g., GaAs ... surrounded by AlGaAs barriers. Such supported structures are treated successfully by the effective mass approximation (EMA) for a particle in an external poten-

supported structure (e.g., a 2D quantum well) and an

In contrast to a supported quantum well, in an isolated quantum ... numerous bands are con...

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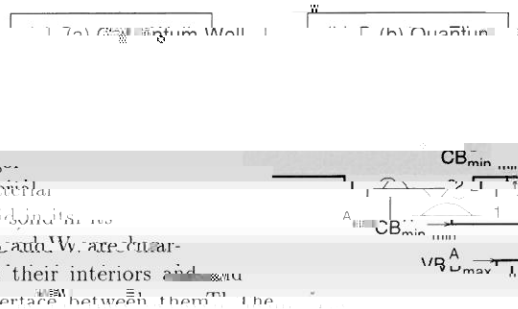
II. THEORETICAL APPROACHES TO



qtum well can be vigor-
ng the
ed as a combined bound
rms destroy both B and W are quar-
v periodic potentials in their interiors and
ential step at the interface between them. The

to the unit cell size has been dropped here, making the
application of the EMA to large offset systems question-
able.) In doing so, one replaces the bulk band structure
um confinement g
a new quantum structure
rrier materials, respectively, selected so that

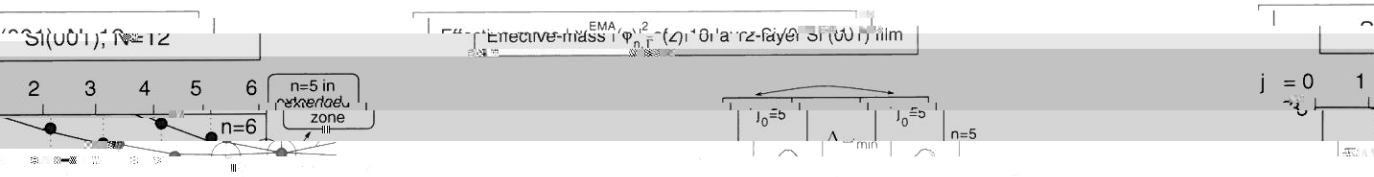
ergy continua. Energy levels
and wavefunctions, indexed by quantum numbers, ν_{EMA} are

The ei
m
tion $\zeta^{\nu_{EMA}}(r)$ will vanish at the boundaries leading to

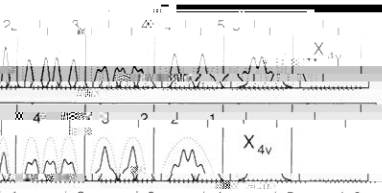
The electronic states of a qu
ously described by consideri
Φ
barrier (B) mate
own right. Th
accurate v
not

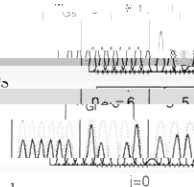
VB^A_{min}
VB^B_{min}

FIG. 1. Schematic depiction of qua
that a quantum well could be grown in a quantum
Quantum wells will be below that, in fact, unlike the quantu


Si(001), N=12
2
3
4
5
6
n=5 in extended zone
n=6
Effective-mass Si(001) film
J_0=5
J_0=5
n=5
j = 0
1

[redacted]


X4v
X4v
j=1
j=2
j=3
j=4
j=5
j=6


j=0

the number of peaks of a film state and its quantum index (n, j) is found. The evolution of energy levels with film layer thickness is examined, revealing the inter-

REFERENCES

[1] G. Bastard, *Wave Mechanics in Physics of Semiconductor*