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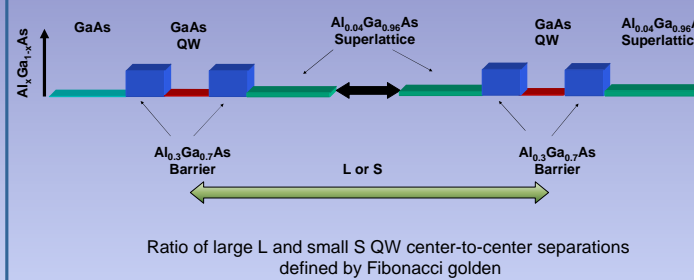
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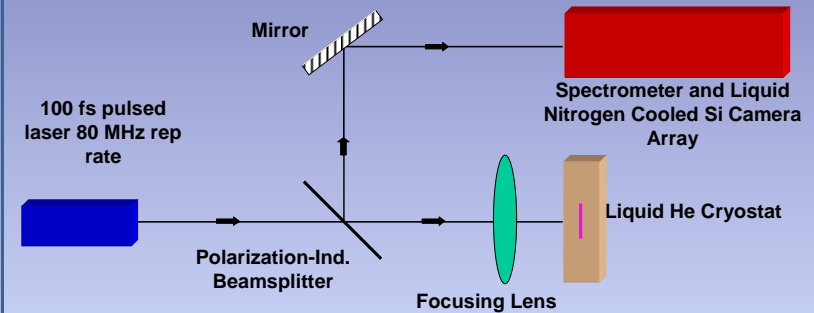
Introduction

- Fibonacci multiple quantum well sample exists in gray area between complete periodicity and total randomness.
- Sample FIB13: 54 GaAs/AlGaAs quantum wells.
- QW center separation defined by Fibonacci golden ratio
- Sample exhibits broad and narrow dip at Bragg condition

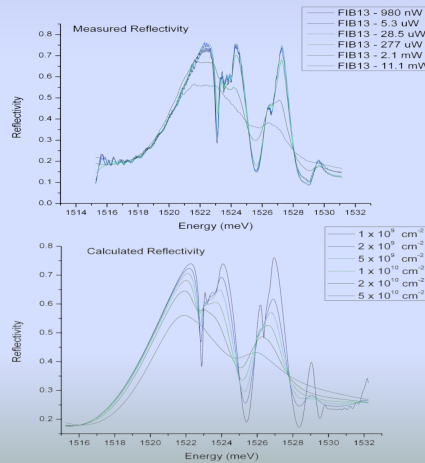
Structure



Apparatus

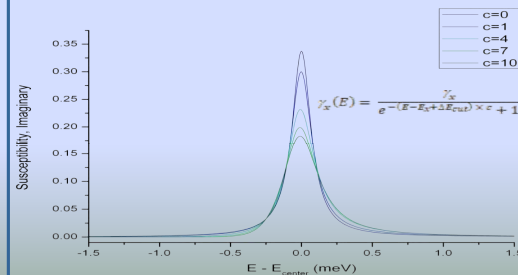


Data

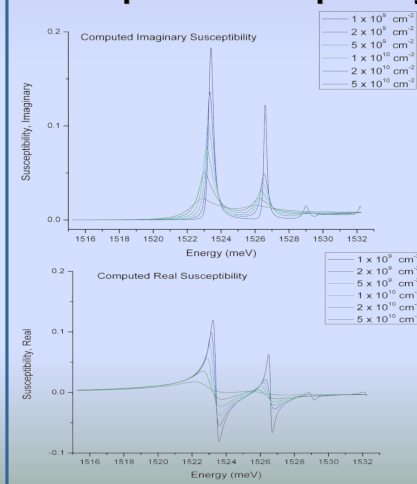


Pump-Probe Theory

- Find linear susceptibility by solving microscopic semiconductor Bloch equations
- Necessary to use an energy-dependent nonradiative broadening $\gamma_\chi(E)$ in a Lorentzian to account for structural disorder in each quantum well (parameters fit to reproduce single quantum well reflectivity and FIB13 sharp dip)
- Put carrier dependent susceptibility $\chi(n)$ into transfer matrix computation of propagation through FIB13

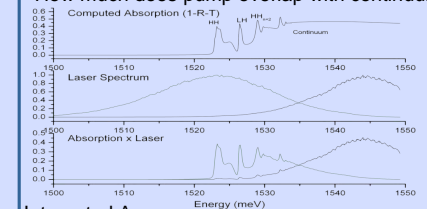


Computed Susceptibility



Single Beam Experiment

- Theory: Above-band pump, resonant probe
- Experiment: Single resonant beam
- How much does pump overlap with continuum?



Integrated Areas

- HH: 2.2×10^{-2} (0.684)
- Continuum: 5.2 (2.06)
- Non-resonant to resonant Ratio: 234 (3.01)
- Agreement between theory and experiment suggests that the nonlinear behavior is dominated by incoherent carriers. The recent experiment with pump in the band gives the same qualitative behavior.