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## Study for active region of quantum cascade lasers in GaAs/AlGaAs structures

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The mechanism of quantum cascade lasers (QCL) is that electrons undergo radiative transitions between confined subbands in conduction-band quantum wells. The wavelength of QCL is calculated from intersubband levels of coupled wells in active region. We designed QCL structure changing well width and external E-field by using shooting method. Using polar optical phonon scattering rate, we designed to happen population inversion within intersubband of coupled well. Also, we designed to get desired wavelength controlling well width of coupled well. And from calculating oscillator strength (or the dipole matrix elements) between intersubbands, we can simulate anti-crossing phenomena between intersubbands and calculate threshold current and absorption coefficient.