

# Report on Project II

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## Abstract

We implemented a program which applies time dependent schrodinger equation to gaussian wavepacket in order to observe the evolution of the particle when it meets with potential walls.

## 1 Software Manual

**Program Usage** Type ./evo in the directory will invoke the program, but user can also specify particle energy, total time steps, sigma of wavepacket, width and height of potential wall, plot or not by feeding command line arguments.

-n [*total simulation time steps*] : specify how long you want the simulation to run

-p : tell the program to plot the animation simulation, otherwise the program will remain silent

-w [*potential wall width*] : set the width of potential wall

-h [*potential wall height*] : set the height of potential wall

-e [*energy*] : energy of gaussian wavepacket

-s [*sigma*] : sigma of gaussian wavepacket

Example:

./evo -p -e 1.0

invoke the program to simulate with the energy of  $1.0V_0$

**Program Result Summary** After finishing the simulation, program will output a summary of the simulation parameters and final results, including the fraction of transmitted wave and bounced wave.

The method I employ to compute the fraction of transmitted wave is very straightforward. I just compute the total wave on the two sides of the wall when simulation finished. Thus, in order to get a precise result, user have to wait until the transmitted wave fully passed the wall. User can adjust the total simulation time steps to assure this.

However, since the program runs very slowly, I recommend waiting for 1-2 minutes for the simulation. Also, please open the -p argument to monitor the simulation process to assure that everything goes well.