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Localization of Interacting Particles in a Random Potential Well

KHANG PHAM, Louisiana State University — In many physics textbooks, the authors often show the time-independent view of a single particle interacting with its surrounding. However, only a fraction of the books presents the time-dependent processes. By introducing the time-dependency, the difficulty of solving the Schrodinger equation becomes much more challenging. To solve such equation, the use of numerical methods, which need to be programmed, is often required. Through many trials, we have developed an open source code written in C++. In this program, we use the Crank-Nicolson method to solve the Schrodinger equation. Crank-Nicolson is an implicit finite-difference method for solving partial differential equations. The program simulates a particle in a two-dimensional space or a system of two interacting particles. Also, parameters such as mass, initial positions and velocities, and potential can be changed with ease.

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