Abstract Submitted
for the TSS21 Meeting of
The American Physical Society

Relativistic Quantum Mechanics for Undergrads AKASH DEEP[1], LUIS GRAVE DE PERALTA[2], Texas Tech Univ — A quantum particle trapped in an infinite one-dimensional well is one of the simplest but most instructive and useful examples often taught in introductory Quantum Mechanics courses. However, solving the same problem when the particle moves at speeds close to the speed of the light in vacuum is considered too complicated even for graduated students. Not anymore, a recently explored Schrödinger-like but relativistic wave equation allows us to solve the infinite one-dimensional well problem for a relativistic spin-0 particle of mass m, as easy as it is shown in textbooks for a non-relativistic particle. The Grave de Peralta (GdeP) and the Schrödinger equations are so formally alike that just by removing the factor 2 in the last one and substituting it by the factor (gamma + 1), one gets the first one. The factor gamma is the well-known Lorentz factor from the Einstein's special theory of relativity. At low particle speeds, the GdeP equation reproduces the results obtained using the Schrödinger one and, at relativistic speeds, it reproduces the results obtained using the Dirac equation. Moreover, the GdeP equation allows for solving several interesting problems in quantum mechanics but using a different relativistic approach.

[1]Presenter
[2]Author

Akash Deep
Texas Tech Univ

Date submitted: 14 Mar 2021 Electronic form version 1.4