

Localization in one-dimensional relativistic quantum mechanics

We have presented relativistic analogue of the celebrated Anderson localization in one dimension. We use Dirac equation to calculate the transmission probability for a spin-1/2 particles incident on a disordered chain of rectangular barriers. Using the transfer matrix formalism, we compute the transmission probability for the case of a large number of identical barriers spread randomly in one dimension. The particular case when the incident particle has three-component momentum exhibiting spin-flip phenomenon is also considered. The remarkable result ensuing from this study is that ours is a systematic generalization of the famous work by Anderson in 1958 – those results are recovered in a non-relativistic limit.

