Contribution ID: **266** Type: **Oral Presentation**

A study of resonant- and bound-state dependence on the variables of a step-potential for a quantum mechanical system by making use of the Jost Functions

Tuesday, 10 July 2012 11:40 (20 minutes)

Abstract content
   (Max 300 words)

System stability is a fundamental concept in understanding nature. In other words, one must be able to determine if a system of particles in a specific scenario can exist indefinitely, or if some sort of decay will take place.

This can provide information on, among others, nuclear and chemical reactions, nuclear decay, and specifically particle scattering. In this talk, resonant and bound state energies for a system of particles with a given step-potential are calculated by making use of the Jost function for the system.

By varying the equivalent mass, radii and potential magnitudes, the energy of the system is affected, thus the state of the system is also affected: this relationship between the potential variables and the state of the system is thoroughly researched for the specific potential.

It is discovered that an increase in the equivalent mass of the system results in a proportional increase in bound states and in bound state energies, as well as a decrease in resonant state energies and resonance state widths.

Potential depth and sharpness also affect the number of bound states, where greater values of an attractive potential results in a proportional increase in bound states and a decrease in virtual states. Greater values of a repulsive potential result in fewer bound states.

Where the attractive and repulsive potentials have the same values, there is an increase in bound state energies for large values, yet there is no increase in the number of bound states. Virtual states exist for small values, but these disappear for larger, wider potential peaks. Resonances are of smaller energies and width for systems of smaller, narrower potential peaks.

Apply to be
 consider for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD)?

Hons

Main supervisor (name and email)
and his / her institution

Prof Sergei Rakitianski. Email: Sergei.Rakitianski@up.ac.za; University of Pretoria.

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

No

Primary author: Mr VAANDRAGER, Paul (University of Pretoria)

Presenter: Mr VAANDRAGER, Paul (University of Pretoria)

Session Classification: Theoretical

Track Classification: Track G - Theoretical and Computational Physics