World Academy of Science, Engineering and Technology
International Journal of Physical and Mathematical Sciences
Vol:9, No:02, 2015

Interaction of Low-Energy Positrons with Mg Atoms: Elastic Scattering, Bound States, and Annihilation

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Abstract : Annihilations, phase shifts, scattering lengths, and elastic cross sections of low energy positrons scattering from magnesium atoms were studied using the least-squares variational method (LSVM). The possibility of positron binding to the magnesium atoms is investigated. A trial wavefunction is suggested to represent e+-Mg elastic scattering and scattering parameters were derived to estimate the binding energy and annihilation rates. The trial function is taken to depend on several adjustable parameters and is improved iteratively by increasing the number of terms. The present results have the same behavior as reported semi-empirical, theoretical, and experimental results. Especially, the estimated positive scattering length supports the possibility of positron-magnesium bound state system that was confirmed in previous experimental and theoretical work.

Keywords : bound wavefunction, positron annihilation, scattering phase shift, scattering length
Conference Title : ICCTP 2015 : International Conference on Computational and Theoretical Physics
Conference Location : Paris, France
Conference Dates : February 23-24, 2015