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Photoionization of a One-Electron *N*-Dimensional Atom

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We consider the photoionization of a one-electron atom in N-dimensional space and derive the total cross-section. It is shown that $\sigma(\omega)$ depends strongly on the dimension N. Thus we emphasize the role of the topological structure of a system on the physical properties of the system.

1. INTRODUCTION

Nowadays it is well recognized that the concept of dimensions plays an important role in theoretical and mathematical physics. Zeng *et al.* (1994, 1997) discussed the transformation between a hydrogen atom and a harmonic oscillator of arbitrary dimensions. Neves and Wotzasek (2000) considered the quantization of a free particle on an N-dimensional sphere, using the Stuckelberg field-shifting formalism. Grosche and Steiner (1987) presented a general framework for treating path integrals on curved manifolds in N-dimensional polar coordinates. Periwal (1995), motivated by studying the strong coupling expansion without perturbation theory, proposed a formula for continuing physical correlation functions to higher dimensions. Craco and Laad (2000) studied electron energy-loss spectroscopy of strongly correlated systems in infinite dimensions. Wo'dkiewic (1991) investigated the theory of zero-range potentials in an arbitrary number of dimensions. Shrock and Wu (2000) presented a formulation for the enumeration of spanning trees in N dimensions. Al-Jaber (1998a) studied the fine structure of the N-dimensional hydrogen atom. Romeo (1995) offered some insight into the dimensional dependence of the Wentzel-Kramers Brillouin approximations in connection with hyperspherical quantum billiards. Al-Jaber (1999) considered Fermi gas in N-dimensional space. Sophocleous (2000) described a class of discrete symmetries for N-dimensional nonlinear wave equations that form, in some cases, cyclic groups of finite order.

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