GEC12-2012-000338

Abstract for an Invited Paper
for the GEC12 Meeting of
the American Physical Society

Single and double ionization of helium: a Sturmian approach[1]

LORENZO UGO ANCARANI, Universite de Lorraine, Metz, France

The quantal description of three-body break-up processes is a notoriously difficult problem, one major obstacle being the imposition of proper asymptotic boundary conditions. In this contribution, single and double ionization of helium are investigated through a Sturmian approach in hyperspherical coordinates. A similar approach, in spherical coordinates, has been applied successfully to a number of two-electron systems (see, e.g., [1]). It is known, though, that for the three particles break-up the global asymptotic behavior (Peterkop) is best described in hyperspherical coordinates. The use of these more natural coordinates, within a Sturmian approach, provide the basis functions with more adequate outgoing asymptotic conditions [2]. In this way the scattering wave function expansion is restricted to the region where the interaction between the particles takes place, considerably increasing the convergence rates. The application of the recently proposed hyperspherical Sturmian approach [2] is applied to ionization processes of helium. The scattering wave function and related differential cross sections will be presented.

[1] A. L. Frapiccini et al, J. Phys. B **43** 101001 (2010); J. M. Randazzo et al, Phys. Rev. A **84**, 052715 (2011).
[2] G. Gasaneo and L. U. Ancarani, J. Phys. A **45**, 045304 (2012).

[1]This work has been developed within the activities planned in the French-Argentinian programme ECOS-Sud A10E01, and in collaboration with G. Gasaneo (Universidad Nacional del Sur, Argentina) and D.M. Mitnik (Universidad de Buenos Aires, Argentina).