ID de Contribution: **16** Type: **Non spécifié**

Complex scaling method for multiple particle collisions

mardi 9 octobre 2012 10:10 (30 minutes)

Regardless of its importance, the theoretical description of the quantum-mechanical collisions turns out to be one of the most complex and slowly advancing problems in theoretical physics. If during few last decades exact numerical solutions for bound states of several nucleons became available, the full solution of the scattering problem (containing elastic, rearrangement and breakup channels) remains limited to the three-body case. There is a long standing dream to develop bound-state like methods for scattering problem. One can recognise several recent efforts to fulfil this dream [1-5].

The main difficulty to solve the scattering problem in configuration space is related to the fact that, unlike the bound state wave functions, scattering wave functions are not localized. One is therefore obliged to solve multidimensional differential equations with extremely complex boundary conditions. Therefore, finding a method which could enable us to solve the scattering problem without an explicit use of the asymptotic form of the wave function is of great importance. In this talk I will present a formalism based on complex-scaling method, which enables solution of the few-body scattering problem using trivial boundary conditions [6-7]. Several applications are provided proving efficiency of the method in describing elastic and three-body breakup reactions for Hamiltonians which may combine short-range, Coulomb as well as optical potentials. As well first results in solving break-up problem for four-nucleon systems will be presented.

References

1. N. Barnea, V. D. Efros, W. Leidemann, and G. Orlandini, Phys. Rev. C 63, 057002 (2001).
2. E. Uzu, H. Kamada, and Y. Koike, Phys. Rev. C 68, 061001 (2003).
3. O. A. Rubtsova, V. N. Pomerantsev, and V. I. Kukulin, Phys. Rev. C 79, 064602 (2009).
4. P. Navratil, R. Roth, S.Quaglioni, Phys. Rev. C 82 034609 (2010).
5. A. Kievsky, M. Viviani, and L. E. Marcucci, Phys. Rev. C 85, 014001 (2012).
6. J. Nuttal and H. L. Cohen, Phys. Rev. 188, 1542 (1969).
7. R. Lazauskas and J. Carbonell, Phys. Rev. C 84, 034002 (2011).

Author: Dr LAZAUSKAS, Rimantas (IPHC Strasbourg)

Orateur: Dr LAZAUSKAS, Rimantas (IPHC Strasbourg)

Classification de Session: Weakly bound quantum systems and reactions

Classification de thématique: Weakly-bound quantum systems and reactions