Formulation of Complex Action Theory

Keiichi Nagao
Department of Education, Ibaraki University, Japan

Vrijeme: 14:00 sati c.t.
Mjesto: IRB, dvorana I krila

Abstract:
We formulate a complex action theory which includes operators of coordinate and momentum \( \hat{q} \) and \( \hat{p} \) being replaced with non-hermitian operators \( \hat{q}_{\text{new}} \) and \( \hat{p}_{\text{new}} \), and their eigenstates \( m <_{\text{new}} q \) and \( m <_{\text{new}} p \) with complex eigenvalues \( q \) and \( p \). Introducing a philosophy of keeping the analyticity in path integration variables, we define a modified set of complex conjugate, real and imaginary parts, hermitian conjugates and bras, and explicitly construct \( \hat{q}_{\text{new}} \), \( \hat{p}_{\text{new}} \), \( m <_{\text{new}} q \) and \( m <_{\text{new}} p \) by formally squeezing coherent states. Only in our formalism can we describe a complex action theory or a real action theory with complex saddle points in the tunnelling effect etc. in terms of bras and kets in the functional integral. Furthermore, in a system with a non-hermitian diagonalizable bounded Hamiltonian, we show that the mechanism to obtain a hermitian Hamiltonian after a long time development works also in the complex coordinate formalism. If the hermitian Hamiltonian is given in a local form, a conserved probability current density can be constructed with two kinds of wave functions. This talk is based on the collaboration with Holger Bech Nielsen.

Voditelj seminara: Dr. Goran Duplančić
\( \langle \text{gorand@thphys.irb.hr} \rangle \)

http://thphys.irb.hr/Seminar/list.htm