Institut Ruđer Bošković
## ZAVOD ZA TEORIJSKU FIZIKU
Bijenička c. 54
Zagreb, Hrvatska

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## SEMINAR ZAVODA ZA TEORIJSKU FIZIKU
(Zajednički seminari Zavoda za teorijsku fiziku,
Zavoda za eksperimentalnu fiziku i Zavoda za teorijsku fiziku PMF-a)

# Formulation of Complex Action Theory

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*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 $\hat{q}_{new}$ and $\hat{p}_{new}$, and their eigenstates $_m <_{new} q|$ and $_m <_{new} p|$ 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 $\hat{q}_{new}$, $\hat{p}_{new}$, $_m <_{new} q|$ and $_m <_{new} p|$ 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.

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