DIPARTIMENTO DI FISICA "E.Fermi"
UNIVERSITÀ DI PISA
CORSO DI DOTTORATO IN FISICA
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Ciclo di lezioni per il CORSO DI DOTTORATO IN FISICA

Dr. Dmitri Antonov

Univ. of Heidelberg

"Path-integral methods as a universal tool in quantum field theory and statistical mechanics"

1. Path integrals in quantum mechanics. Euclidean formulation of quantum mechanics. Path integral for a harmonic oscillator. An analogy between the Euclidean formulation of quantum mechanics in D dimensions and statistical mechanics in D spatial and 1 temporal dimensions in equilibrium.
2. A free-boson propagator at finite temperature. A path-integral derivation of the partition function of an ideal Bose gas in quantum statistics.
3. Instantons in quantum mechanics. An analogy with 1D Ising model. Basics of Yang-Mills instantons.
4. One-loop effective action of a particle in a gauge field. A path-integral derivation of the Euler-Heisenberg Lagrangian. Schwinger formula and the decay of a metastable vacuum. World-line instantons.
5. More applications of path integrals: Polyakov's derivation of the one-loop running coupling in 2D nonlinear 0(*N)* sigma-model and in 4D Yang-Mills theory. Fujikawa's derivation of chiral (Adler-Bell-Jackiw) anomaly in QED.

Martedì 19/5 ore10-12	AULA R1 Ed. B	Martedì 26/5 ore 10-12	AULA R1 Ed. B
Mercoledi 20/5 ore 9-11	AULA 248 Ed. C	Mercoledì 27/5 ore 9-11	AULA 248 Ed.C
Giovedì 21/5 ore 9-10	AULA R1 Ed.B	Giovedì 28/5 ore 9-10	AULA R1 Ed. B

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