Corso di Dottorato, Dipartimento di Fisica dell'Università di Genova

A.A. 2018-19

The renormalization group equation à la Wilson-Polchinski
Prof. Camillo Imbimbo

Syllabus

- 1. Functional Methods in QFT: The functional generators of connected, amputated, and 1-particle-irreducible Green functions.

- 2. The Wilsonian effective action: ultraviolet and infrared regulated propagators.

- 3. The Wilson-Polchinski renormalization group equation for the Wilsonian effective action.

- 4. The Wilson-Polchinski RG equation for the 1PI effective action.

- 5. The renormalization of QFT: irrelevant, relevant and marginal operators. The naturalness criterion in quantum field theories: The fine-tuning problem of scalar masses in the standard model. Asymptotic freedom.

- 6. The "Local Potential Approximation" of the Wilson-Polchinski RG equation. Fixed points of the RG equation.

- 7. The 1/N expansion and the topological classification of Feynman diagrams and the RG equation.