

Ruder Bošković Institute Division of Theoretical Physics

TWINNING LECTURES

INTRODUCTION TO EFFECTIVE FIELD THEORIES

OSCAR CATA

Ludwig-Maximilians-Universität (LMU), Munich, Germany

LECTURE 1

Wednesday, June 15, 11 a.m. - 1 p.m.

Lecture hall, Wing 1

LECTURE 2

Thursday, June 16, 2 p.m. - 4 p.m.

Lecture hall, Wing 1

LECTURE 3

Friday, June 17, 11 a.m. - 1 p.m.

Lecture hall, Wing 1

ABSTRACT:

In this set of lectures I will give a self-contained overview of effective field theories (EFTs), starting from foundational aspects and ending with up-to-date applications for new physics searches at the LHC. The contents of these lectures will be structured in three parts: in an introductory part I will review the physical motivations behind EFTs and discuss the basic pillars upon which the framework rests. To illustrate the richness of the methodology, I will briefly comment on the specifics of a number of EFTs that are currently in use in different context of particle physics. I will then specialize to EFTs at the electro-weak scale, addressing in detail the dynamical differences between linear and nonlinear realizations when spontaneously broken symmetries are present. In the final part I will turn to phenomenology and discuss what the current status of EFTs at the LHC is both for new physics searches and more specifically to characterize the properties of the Higgs boson in the upcoming Run II and III.



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