

CEMS.UL
CENTER FOR MATHEMATICAL STUDIES

Mini-Course

Higgs Bundles: An Introduction Through Gauge

Theory by **Pedro M. Silva** (Pos-doc - CEMS.UL)

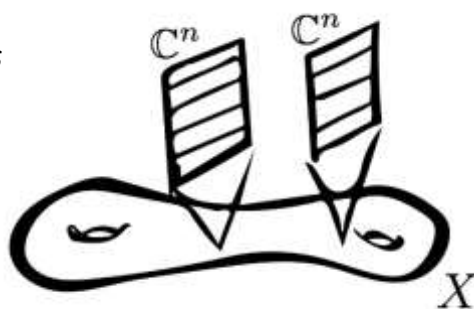
January | Faculty of Sciences, University of Lisbon | **room 6.2.33**

Holomorphic vector bundles and Higgs bundles

28/01/2025 - 10:30 to 12:00

The non-abelian Hodge correspondence and representations of surface groups

30 and 31/01/2025 - 14:00 to 15:30



Higgs bundles are complex analytic objects that codify information about representations of the fundamental group of a closed surface S , using equations coming from mathematical physics. These objects were introduced by Hitchin in the 80s while studying a reduction of the self-dual Yang-Mills equations to one complex dimension. Ever since, the theory has been under intense research, finding its definite place in the study of character varieties, hyperkähler manifolds, geometric structures on surfaces, Hamiltonian integrable systems, and several other topics of complex, algebraic, and symplectic geometry.

The purpose of this short course is to provide an overview of the theory of Higgs bundles from the perspective of gauge theory (vector bundles, flat connections, etc.).

We will introduce the basic notions of Higgs bundles and relate them with representations of the fundamental group of a surface, by stating and studying the non-abelian Hodge correspondence. The focus will be on examples and general context, rather than on the technical tools.

Recommended pre-requisites: Rudiments of complex manifolds, vector bundles, and connections. (Master's/PhD students are welcome)