CENTRO DE MATEMÁTICA UNIVERSIDADE DO PORTO

Geometry and Topology Seminar

Higgs Bundles on Complex Tori

(Non)-abelian Hodge correspondence, conformal limit and projective structures

Pedro Silva

Heidelberg University

Abstract. On a compact Kähler manifold X, the non-abelian Hodge correspondence establishes a homeomorphism between the moduli space $\mathcal{M}$ of polystable Higgs bundles $(E, \overline{\partial}_E, \Phi)$ of rank n and degree zero and the character variety $\mathcal{X}$, i.e. the space of completely reducible representations of the fundamental group $\pi_1(X)$ in $\mathrm{GL}(n, \mathbb{C})$. The correspondence involves finding a metric on E solving Hitchin's equation, a non-linear PDE coupling the holomorphic structure $\overline{\partial}_E$ and the Higgs field Φ.

In this talk we will study the special situation when X is a complex torus $X = \mathbb{C}^g/\Lambda$, with Λ a lattice. In this case, Hitchin's equation is known to become abelian, losing its dependence on Φ. We will review the explicit description of the moduli spaces and the (now) abelian correspondence, and use this to prove the existence of Gaiotto's conformal limit for every polystable Higgs bundle. We will also show how for certain rank-g Higgs bundles, the construction is related to complex projective structures on the torus X. This is joint work with C. Florentino.

Tuesday, June 16 **15h30** **Room: 1.09**

With the support of UID/00144/2025 – Centro de Matemática da Universidade do Porto

There will be coffee after the talk.