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Purity of the moduli stack of G-Higgs bundles over a smooth projective curve

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The moduli spaces of Higgs bundles over a smooth projective curve, and more generally of G-Higgs bundles for a reductive group G, play a central role in the geometric Langlands program. It has been observed that working with the moduli stacks themselves is equally (if not more) natural: they exhibit richer structures that facilitate their study. For instance, these stacks admit derived enhancements that carry a symplectic structure. From an enumerative viewpoint, taking the stack into account is crucial, as it reflects the presence of strictly semistable objects.

In this talk, I will explain how to prove that a certain class of stacks, which includes the stacks of semistable G-Higgs bundles over a smooth projective curve, has pure Borel-Moore homology. To establish this, we employ tools from cohomological Donaldson-Thomas theory. A key ingredient is the construction of a cohomological integrality isomorphism.

Orateur: HENNECART, Lucien