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Mapping spaces and automorphism groups in toric NC geometry

Abstract

Given two spaces X and Y, it is natural to ask whether one can construct a 'space of mappings' from X to Y. Such mapping spaces have a wide range of important applications, for example in studying the geometry of automorphism groups of spaces, gauge groups of principal bundles and sigma-models in mathematical physics. In this talk I will present a sheaf theoretic approach to toric NC spaces, such as the Connes-Landi spheres, which allows for the construction of mapping spaces. I will show that the automorphism group of a toric NC space that is obtained from our concept of mapping spaces is considerably 'bigger' than its naive (category theoretical) automorphism group. Using techniques from synthetic geometry, one can construct the Lie algebras of such automorphism groups and I will show how to identify them with braided derivations of the function algebra of the underlying toric NC space. As a further application, I define the gauge group of a toric NC principal bundle (i.e. Hopf-Galois extension) and compute its Lie algebra. This talk is based on joint work with G. E. Barnes and R. J. Szabo [arXiv:1606.04775 [math.QA]].