

On algebraic description of the Goldman-Turaev Lie bialgebra

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This is based on a joint work with Nariya Kawazumi (The University of Tokyo). For a fixed oriented surface, we consider two operations on the free module with basis the homotopy set of oriented loops on the surface. The first one, called the Goldman bracket, is a binary operation and measures the intersection of two loops. The second one, called the Turaev cobracket, is an unary operation and measures the self-intersection of a loop. These two operations constitute the structure morphisms of the Goldman-Turaev Lie bialgebra.

As was shown by Kawazumi and Kuno, and later by Massuyeau and Turaev with some refinement, the Goldman bracket has an algebraic description, i.e., one can express it in terms of the derivations on the tensor algebra generated by the first homology of the surface. In this talk, we would like to address the problem of finding such a description for the Turaev cobracket. We will present some partial results and report the current status of the problem.