YULY BILLIG, Carleton University
Algebraic Gelfand-Fuks cohomology

Starting in the late 1960s, Gelfand's school actively studied cohomology theory for the Lie algebras of vector fields. It was realized, that beyond the simplest examples, computation of the general cohomology of these algebras is intractable. To make computations possible, a special cohomology theory was introduced by Gelfand and Fuks. Many results on Gelfand-Fuks cohomology were established in an analytic setting of C^∞ varieties.

In this talk, we introduce algebraic Gelfand-Fuks cohomology of polynomial vector fields on an affine algebraic variety, with coefficients in differentiable AV-modules. Its complex is given by cochains that are differential operators in the sense of Grothendieck. Using the jets of vector fields, we compute this cohomology for varieties with uniformizing parameters. We prove that in this case, Gelfand-Fuks cohomology with coefficients in a tensor module decomposes as a tensor product of the de Rham cohomology of the variety and the cohomology of the Lie algebra of vector fields on affine space, vanishing at the origin. We explicitly compute this cohomology for affine space, the torus, and Krichever-Novikov algebras.

This talk is based on a joint work with Kathlyn Dykes.