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AV-modules

We wish to understand the representation theory of the Lie algebra V of vector fields on a smooth algebraic variety X. We introduce the category of AV-modules, which admit compatible actions of the Lie algebra of vector fields V and the commutative algebra A of functions on X. Modules over the algebra D of differential operators, or D-modules, form an important subcategory of AV-modules. Still, there are many natural examples of AV-modules that are not D-modules, like vector fields themselves. AV-modules were instrumental in establishing recent classification theorems of weight modules over the torus and the affine (super) spaces, however, we can study them in a much more general setting. In this talk, we shall discuss the theory of AV-modules over affine and projective varieties.