

Deformations of algebras via Gröbner bases and applications to deformation quantization

Severin Barmeier (Univ. Freiburg)

Abstract: In recent joint work with Zhengfang Wang we gave a combinatorial description of the deformation theory of associative algebras using ideas from the theory of noncommutative Gröbner bases. Applied to the case of the (commutative) polynomial algebra in n variables, this point of view can be used to give explicit formulae for star products on affine n -space. Although we currently cannot yet give a universal formula for the quantization of Poisson structures with this approach, there exists a straightforward combinatorial criterion to check if a Poisson structure can be quantized in this way. The resulting formula for the star product can be written as a sum of bidifferential operators associated to graphs, similar to Kontsevich's universal formula, however for the combinatorial star product the "weights" of these graphs can be taken to be 1.