Deformation quantization and Hochschild cohomologies of fibred manifolds

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23.04.2015

In this talk I first want to consider the deformation quantization of fibred manifolds, which for example are considered in the construction of noncommutative field theories. This means given a fibred manifold $P \to M$, where M is equipped with a formal star product, we are interested in a $(\mathcal{C}^\infty(M)[\![\lambda]\!], \star)$-module or bimodule structure on $\mathcal{C}^\infty(P)[\![\lambda]\!]$. such that the classical limit is given by the (bi)module structure coming from the pullback along the projection. It turns out that in the case when M is symplectic a bimodule deformation can only exist if there exists a flat connection on P. This obstruction already exists in the semi classical limit, which is given by a Poisson module.

In the second part of the talk I want to give a generalisation of the Hochschild-Kostant-Rosenberg-Theorem for the functions and differential operators on N for a certain type of maps $N \to M$ - including fibred manifolds -, where the bimodule structure again is given by the pullback. This is interesting, because the obstruction for the construction a deformation of a fibre bundle is given by elements in this Hochschild cohomologies.