
2002d:17021 17B63 53D17 53D50 81R05 81S10

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On quantizing nilpotent and solvable basic algebras. (English. English summary)

Canad. Math. Bull. **44** (2001), *no.* 2, 140–149.

Let M be a symplectic manifold, and suppose that $\mathfrak{b}$ is a finite-dimensional "basic algebra" of observables on M. Given a Lie subalgebra O of the Poisson algebra $C^\infty(M)$ containing $\mathfrak{b}$, the authors are interested in determining whether the pair $(O, \mathfrak{b})$ can be quantized. The main result in this paper is that: Let $\mathfrak{b}$ be a nilpotent basic algebra on a connected symplectic manifold. Then there is no quantization for the pair $(P(\mathfrak{b}), \mathfrak{b})$, where $P(\mathfrak{b})$ is the Poisson algebra of polynomials on M generated by $\mathfrak{b}$.

This in turn is a consequence of an algebraic "no-go theorem" to the effect that a nontrivial Poisson algebra cannot be realized as an associative algebra with the commutator bracket. Their result generalizes Groenewold's famous theorem on the impossibility of quantizing the Poisson algebra of polynomials on $\mathbb{R}^{2n}$.

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