2000a:53153 53D50 81S10

Gotay, Mark J. (1-HI)

On the Groenewold-Van Hove problem for $\mathbf{R}^{2n}$. (English. English summary)

J. Math. Phys. **40** (1999), *no.* 4, 2107–2116.

The classical results of Groenewold and Van Hove state, roughly speaking, that one cannot quantize every classical observable on the phase space $\mathbf{R}^{2n}$ in a way consistent with Schrodinger quantization.

In the paper under review the author shows rigorously that there exists an obstruction to quantizing the Poisson algebra of polynomials on $\mathbf{R}^{2n}$ in such a way that the Heisenberg algebra generated by canonical coordinates is represented irreducibly, thereby filling a gap in Groenewold's original proof. Moreover, for $n = 1$, the maximal quantizable Lie subalgebras of polynomials are determined and their possible quantizations are explicitly constructed. These are the extended symplectic algebra $\mathrm{hsp}(2, \mathbf{R})$ with the extended metaplectic representation, and the coordinate (or position) algebra $C(2)$ with the representations

$$\sigma_a(f(q)p + g(q)) = -i\hbar\left(f(q)\frac{\partial}{\partial q} + \left(\frac{1}{2} + ia\right)\frac{\partial f}{\partial q}(q)\right) + g(q),$$

where $a \in \mathbf{R}$.

Janusz Grabowski (PL-WASW)