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A No-Go Theorem for Nonlinear Canonical Quantization

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Abstract: We want to point out the following strengthening of the classical theorem of Groenewold and van Hove: There exists no mapping Op from polynomial observables f(p,q) on the phase space R^{2n} into linear operators on $L^2(R^n)$ which would map Poisson brackets into commutators, the position and momentum observables p and q into the usual (Schrödinger) position and momentum operators, and would obey the von Neumann rule $Op(cf^k)=c\,Op(f)^k$ for $k=1,2,3$ and $c\in R$. The point is that neither linearity, nor continuity etc. of Op are assumed.

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Key words: no-go theorem, canonical quantization, nonlinear quantization

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