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A Groenewold-van Hove theorem for S^2 . (English. English summary)

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In the paper the “no-go” theorem of Groenewold-van Hove on the non-existence of quantization of the Poisson algebra of polynomials on \mathbf{R}^{2n} is carried over to the case of the standard sphere S^2 . Consider the following Poisson algebras on S^2 : the algebra \mathcal{P} of all polynomials on S^2 , the algebra \mathcal{P}^1 of polynomials of degree at most 1, and the algebra $\tilde{\mathcal{O}}$ of polynomials all of whose terms but the constant one are of odd degree. It is proved that the only representations of \mathcal{P} and $\tilde{\mathcal{O}}$ irreducible on \mathcal{P}^1 are one-dimensional representations. Then it is shown that \mathcal{P}^1 is a maximal Poisson subalgebra in $\tilde{\mathcal{O}}$. Thus no nontrivial quantization of \mathcal{P}^1 can be extended beyond \mathcal{P}^1 .

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