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Obstruction results in quantization theory. (English. English summary)

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This survey article is divided into five sections: (1) Introduction, (2) Prequantization, (3) Basic sets and quantization, (4) Examples and (5) Speculations. In the first section the authors state the problem and continue into the next section with a careful presentation of prequantization and quantization procedures. Various axiomatic schemes pursuing sensible quantization theory are discussed in the third section. Transitivity, completeness, irreducibility, minimality, and integrability in the appropriate classical or quantum setting are examined in depth here as well. The “no-go” theorem of Groenewold-van Hove for the standard classical phase space \mathbf{R}^{2n} , and the answers to the same problem for the compact two-dimensional manifolds—the sphere S^2 and the torus T^2 —are reviewed in the fourth section. Finally, in the last section the authors state three conjectures which provide further abstract formulation and generalization of the concrete results for \mathbf{R}^{2n} , S^2 and T^2 . The most valuable aspect of the authors’ approach is that the whole discussion of the fundamental issue of quantization is made without relying on any particular scheme, since only the structural aspects of the theory are considered.

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