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Position and momentum measurements: classification and coexistence.

Positive operator valued measures (POVM) play an important role in quantum mechanics. Quite often physical considerations suggest considering POVMs that are covariant with respect to a unitary representation of a given symmetry group G . We illustrate a general technique, based on the generalized imprimitivity theorem, for classifying POVMs that are covariant with respect to a given unitary representation. We describe the results obtained by applying this procedure to the case of POVMs based on \mathbb{R} , that are covariant with respect to the Weyl-Heisenberg group. The POVMs obtained in this way have a natural interpretation as position and momentum observables and they are "fuzzy versions" of the canonical PVMs. We give some results concerning the existence of joint observables.

Finally, we outline a possible extension of the above mentioned methods for obtaining a classification of covariant instruments.