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TESTING STATISTICAL HYPOTHESES IN QUANTUM THEORY

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Abstract: The paper presents an account of quantum hypotheses testing theory and the new contributions clarifying the role of orthogonal resolutions of identity (simple measurements) in the quantum Bayes problem. It is shown that the maximum likelihood measurement is simple for the family of states with linearly independent ranges. This is an extension of Kennedy's result for the pure states. A counterexample to an old physical conjecture is constructed showing that in the Bayes problem with the total number of decisions less than or equal to the dimension of the underlying Hilbert space the Bayes measurement may not be simple. However, it is shown that in the infinite-dimensional case there always exists an ε-Bayes simple measurement.

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