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On the geometry of non-maximal strata qudit space with Bures metric

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Modern applications of quantum mechanics renewed interest in the properties of the set of density matrices of finite size. The issue of establishing of Riemannian structures on the quantum counterparts of space of probability measures became a subject of recent investigations.

We study quantum analogues of a well-known, natural Riemannian metric, the so-called Fisher metric. Explicit formulae for the Bures metric are known for special cases: e.g. J. Dittmann has derived several explicit formulae on the manifold of finite-dimensional non-singular density matrices. However, owing to the non-trivial differential geometry of the state space, studies of its Riemannian structures require a refined analysis for the non maximal rank density matrices. We calculate the metric and discuss several geometric properties of the qudit state space.

Summary

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