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Quantum state space as a maximal consistent set[1] GELO NOEL TABIA, University of Waterloo, Perimeter Institute for Theoretical Physics, and Institute for Quantum Computing — Measurement statistics in quantum theory are obtained from the Born rule and the uniqueness of the probability measure it assigns through quantum states is guaranteed by Gleason's theorem. Thus, a possible systematic way of exploring the geometry of quantum state space expresses quantum states in terms of outcome probabilities of a symmetric informationally complete measurement. This specific choice for representing quantum states is motivated by how the associated probability space provides a natural venue for characterizing the set of quantum states as a geometric construct called a maximal consistent set. We define the conditions for consistency and maximality of a set, provide some examples of maximal consistent sets and attempt to deduce the steps for building up a maximal consistent set of probability distributions equivalent to Hilbert space. In particular, we demonstrate how the reconstruction procedure works for qutrits and observe how it reveals an elegant underlying symmetry among five SIC-POVMs and a complete set of mutually unbiased bases, known in finite affine geometry as the Hesse configuration.

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Gelo Noel Tabia
University of Waterloo, Perimeter Institute for Theoretical Physics,
and Institute for Quantum Computing

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