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Information geometry with correlated data: Bayesian explorations of cosmological predictions for the microwave background radiation[1] KATHERINE QUINN, FRANCESCO DE BERNARDIS, MICHAEL NIEMACK, JAMES SETHNA, Cornell Univ — We developed a new, generalized fitting algorithm for miltiparameter models which incorporates varying and correlated errors. This was combined with geometrical methods of sampling to explore model prediction space, notably to plot geodesics and determine the size and edges of the model manifold. We illustrate this using the microwave background spectra for all possible universes, as described by the standard Λ-cold dark matter (Λ-CDM) cosmological model. In this case, the predicted data are fluctuations and highly correlated with varying errors, resulting in a manifold with a varying metric (as the natural metric to use is given by the Fisher information matrix). Furthermore, the model manifold shares the hyperribbon structure seen in other models, with the edges forming a strongly distorted image of a hypercube. Practical applications of such an analysis include optimizing experimental instrumentation designed to test more detailed cosmological theories.

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Katherine Quinn
Cornell Univ

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