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An information geometric approach to holography

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The search for a complete theory of quantum gravity remains the biggest challenge for high energy theoretical physics. Despite many proposed approaches, with string theory being the most promising one, it is still unclear. A remarkable contribution was due to Maldacena, in his landmark paper (1), he showed that a particular kind of string theory is dual to a Yang-Mills theory, his ideas were developed into the AdS/CFT correspondence (also known as a holographic duality), which consists of a mathematically precise description of duality between a quantum theory of gravity and a conformal field theory. In the context of the correspondence, Ryu and Takayanagi (2) showed that entanglement entropy, which is a quantum information-theoretic quantity, can be calculated holographically, serving as both evidence for the duality as well as a tool to further explore the consequences and properties of the AdS/CFT correspondence. Miyaji *et al.* (3) showed that the Fisher metric, which provides the distance between quantum states, is another example of an information-theoretic quantity that can be calculated holographically in a precise manner. In this work, we propose to extend the ideas present in the previous articles to other information metrics, such as the Wigner-Yanase and the Bogoliubov metrics, to define a precise and general holographic description of information metrics.

Palavras-chave: Information geometry. Quantum information theory. Holography.

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