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## Statistical mechanics with nonadditive entropies – Concepts and applications

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Galileo's celebrated composition law for velocities is additive. Its generalization in special relativity is not. Why did Einstein violate that simple nice additivity? Because that was a small price to pay in order to achieve a more important goal, namely, to unify mechanics and electromagnetism through the Lorentz transformation of space-time. Analogously, the violation of additivity for entropic functionals is a small price to pay in order to achieve a more important goal, namely, to preserve the Legendre transformation structure of classical thermodynamics. The negation of additivity for a general physical entropic functional grounding a generalization of Boltzmann-Gibbs statistical mechanics is similar to the negation of the fifth postulate of Euclid, which led Riemann to the celebrated curved geometries, the mathematical basis for general relativity. I will elaborate on those concepts and illustrate, for some selected systems, how they can be very useful in handling complexity in physics and elsewhere. Bibliography at <https://tsallis.cbpf.br/biblio.htm>

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