

**PRINCIPIUM LUXURIAE: MULTISCALE THERMODYNAMICS TO LIVING AND NON-LIVING  
COMPLEX SYSTEMS**

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**ABSTRACT**

Multiscale systems, such as fractals or complex systems, are difficult to analyze because physical descriptions usually focus on macroscopic scales, ignoring reactions that can occur at smaller scales. This leads us to wonder if there is some type of principle that allows us to derive the dynamics of multiscale systems considering all these scales. Along these lines, the Principium Luxuriæ establishes that the efficiency of energy dissipation on a small scale determines the appearance of complex structures, while macroscopic dissipation is associated with emergent behaviors. The possible applications of this principle in physical and biological systems are discussed.

Keywords: fractal dimension, Principium luxuriæ, complex systems, multiscale entropy