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ON THE CONNECTION BETWEEN THE SECOND LAW OF THERMODYNAMICS AND THE SECOND POSTULATE OF RELATIVITY THEORY: SOME ILLUSTRATIONS

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ABSTRACT

In our presentation, we wish to show a similarity of meaning between the Second law of Thermodynamics and the Second postulate of Relativity theory. The concept that allows us to include both principles in the same view is that of homogeneity in space. The Second law expresses that, for an isolated system, matter tends to organize itself in such a way as to occupy a homogeneous distribution in space (through the link between temporal derivatives and spatial gradients). For its part, the Second postulate expresses the "constancy of the speed of light". Without discussing again the meaning of the word *speed* (nor the relations between the two postulates of relativity theory), this convention is essential to establish regular graduations allowing to measure space; to have an operational meaning, these graduations must be based on matter. If this is the case, the homogeneity of space can then be seen, can then be said, whether it is governed by the Second law or by another cause. The two principles studied can both be understood within a probabilistic vision.

Some illustrations will be given from the social sciences, at least as allegories. There are indeed many situations in social life where the spatial distances between people must conform to a homogeneous distribution: think of the sanitary distances imposed by the Covid pandemic! Any deviation from homogeneity manifests "forces" that it is interesting to study in order to better understand society (think of the inhomogeneous spatial distribution of the ordinary people and of the priests in a church or a temple; the inhomogeneous spatial distribution of social classes in cities).

Keywords: second law of thermodynamics, second postulate of relativity theory, homogeneity, probability, social sciences

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