Pennini, F.; **Plastino, A.**

Statistical manifestation of quantum correlations via disequilibrium. (English) Zbl 1375.82076

Phys. Lett., A 381, No. 46, 3849-3854 (2017).

Summary: The statistical notion of disequilibrium (D) was introduced by *R. López-Ruiz* et al. ["A statistical measure of complexity", Phys. Lett., A 209, No. 5–6, 321–326 (1995; doi:10.1016/0375-9601(95)00867-5)] more than 20 years ago. D measures the amount of "correlational structure" of a system. We wish to use D to analyze one of the simplest types of quantum correlations, those present in gaseous systems due to symmetry considerations. To this end, we extend the LMC formalism to the grand canonical environment and show that D displays distinctive behaviors for simple gases, that allow for interesting insights into their structural properties.

MSC:

82C22 Interacting particle systems in time-dependent statistical mechanics
81P40 Quantum coherence, entanglement, quantum correlations

Keywords:

quantum occupation numbers; disequilibrium; quantum gaseous systems; symmetry

Full Text: DOI

References:

[1] López-Ruiz, R.; Mancini, H. L.; Calbet, X., A statistical measure of complexity, Phys. Lett. A, 209, 321-326, (1995)

[2] Crutchfield, J. P., The calculi of emergence: computation, dynamics and induction, Physica D, 75, 11-54, (1994) · Zbl 0860.68046

[3] Feldman, D. P.; Crutchfield, J. P., Measures of statistical complexity: why?, Phys. Lett. A, 238, 244-252, (1998) · Zbl 1026.82505

[4] Pennnini, F.; Plastino, A., Disequilibrium, thermodynamic relations, and Rényi's entropy, Phys. Lett. A, 381, 212-215, (2017) · Zbl 1372.94373

[5] Martin, M. T.; Plastino, A.; Rosso, O. A., Statistical complexity and disequilibrium, Phys. Lett. A, 311, 126-132, (2003) · Zbl 1060.60500

[6] Rudnicki, L.; Toranzo, I. V.; Sánchez-Moreno, P.; Dehesa, J. S., Monotone measures of statistical complexity, Phys. Lett. A, 380, 377-380, (2016) · Zbl 1349.81065

[7] López-Ruiz, R.; Mancini, H.; Calbet, X., A statistical measure of complexity, (Kowalski, A.; Rossignoli, R.; Curado, E. M.C., Concepts and Recent Advances in Generalized Information Measures and Statistics, (2013), Bentham Science Books New York), 147-168

[8] (Sen, K. D., Statistical Complexity. Applications in Electronic Structure, (2011), Springer Berlin)

[9] Mitchell, M., Complexity: A guided tour, (2009), Oxford University Press Oxford, England · Zbl 1215.00003

[10] Martin, M. T.; Plastino, A.; Rosso, O. A., Generalized statistical complexity measures: geometrical and analytical properties, Physica A, 369, 439-462, (2006)

[11] Vedral, V., Classical correlations and entanglement in quantum measurements, Phys. Rev. Lett., 90, (2003)

[12] Li, N.; Luo, S., Classical states versus separable states, Phys. Rev. A, 78, (2008)

[13] Bellomo, G.; Plastino, A.; Plastino, A. R., Classical extension of quantum-correlated separable states, Int. J. Quantum Inf., 13, (2015) · Zbl 1320.81025

[14] López-Ruiz, R., Complexity in some physical systems, Int. J. Bifurc. Chaos, 11, 2669-2673, (2001)

[15] Sañudo, J.; López-Ruiz, R., Calculation of statistical entropic measures in a model of solids, Phys. Lett. A, 376, 2288-2291, (2012)

[16] Huang, Kerson, Statistical mechanics, (1987), Wiley USA · Zbl 1041.82500

[17] Pathria, R. K., Statistical mechanics, (1996), Butterworth-Heinemann Oxford, UK · Zbl 0862.00007

[18] Mattuck, R. D., A guide to Feynman diagrams in the many body problem, (1967), McGraw Hill New York

paper as accurately as possible without claiming the completeness or perfect precision of the matching.