The Gibbs Paradox

• What is the Gibbs paradox and how, if at all, may it be solved?

References

- Darrigol, Olivier. 1988. "Statistics and Combinatorics in Early Quantum Theory." *Historical Studies in the Physical and Biological Sciences* 19 (1): 17–80.
- ——. 1991. "Statistics and Combinatorics in Early Quantum Theory, II: Early Symptoma of Indistinguishability and Holism." *Historical Studies in the Physical and Biological Sciences* 21 (2): 237–298.
- ——. 2018. "The Gibbs Paradox: Early History and Solutions." *Entropy* 20 (443).
- Denbigh, K. G., and J. S. Denbigh. 1985. Entropy in Relation to Incomplete Knowledge. Cambridge University Press.
- Denbigh, K. G., and M. L. G. Redhead. 1989. "Gibbs' Paradox and Non-Uniform Convergence." *Synthese* 81 (3): 283–312.
- Dieks, Dennis. 2011. "The Gibbs Paradox Revisited." In Explanation, Prediction, and Confirmation, edited by Dennis Dieks, Wenceslao J. Gonzalez, Stephan Hartmann, Thomas Uebel, and Marcel Weber, 367–377. Dordrecht: Springer Netherlands.
- ——. 2013. "Is There a Unique Physical Entropy? Micro versus Macro." In *New Challenges to Philosophy of Science*, edited by H. Andersen, D. Dieks, W González, T. Uebel, and G. Wheeler, 23–34. Springer Verlag.
- ———. 2014. "The Logic of Identity: Distinguishability and Indistinguishability in Classical and Quantum Physics." Foundations of Physics 44 (12): 1302–1316.
- ———. 2018. "The Gibbs Paradox and Particle Individuality." Entropy 20 (6).
- French, S., and D Krause. 2006. *Identity in Physics: A Historical, Philosophical, and Formal Analysis*. OUP: Clarendon Press.
- French, Steven. 2000. "Identity and Individuality in Quantum Theory." In *The Stanford Encyclopedia of Philosophy*, Winter 2019, edited by Edward N. Zalta. Metaphysics Research Lab, Stanford University.
- French, Steven, and Dean Rickles. 2003. "Understanding Permutation Symmetry." In *Symmetries in Physics: Philosophical Reflections*, edited by Katherine Brading and Elena Castellani, 212–238. Cambridge University Press.

- Gibbs, J. W. 1878. "On the Equilibrium of Heterogeneous Substances." *Transactions of the Connecticut Academy of Arts and Sciences* (3): 108–248 and 343–524.
- ——. 1902. Elementary Principles in Statistical Mechanics. New Haven: Yale University Press.
- Jaynes, E. T. 1992. "The Gibbs Paradox." In *Maximum-entropy and Bayesian methods*, edited by G. Erickson, P. P. Neudorfer, and C. R. Smith, 1–21. Dordrecht: Kluwer.
- Saunders, Simon. 2013. "Indistinguishability." In *The Oxford Handbook of Philosophy of Physics*, edited by R. Batterman, 340–380. Oxford University Press
- ——. 2018. "The Gibbs Paradox." Entropy 20 (8).
- Schrödinger, Erwin. 1989. Statistical Thermodynamics. New York: Dover.
- Swendsen, R. H. 2018. "Probability, Entropy, and Gibbs' Paradox(es)." *Entropy* 20 (450).
- van Lith, Janneke. 2018. "The Gibbs Paradox: Lessons from Thermodynamics." Entropy 20 (5).
- Versteegh, M. A. M., and Dennis Dieks. 2011. "The Gibbs paradox and the distinguishability of identical particles." *American Journal of Physics* 79:741–746.
- Wills, James. 2020. "Classical Particle Indistinguishability, Precisely." Forthcoming in the *BJPS*.