

# The Gibbs Paradox Revisited

[Dennis Dieks](#)

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The Gibbs paradox has frequently been interpreted as a sign that particles of the same kind are fundamentally indistinguishable; and that quantum mechanics, with its identical fermions and bosons, is indispensable for making sense of this. In this article we shall argue, on the contrary, that analysis of the paradox supports the idea that classical particles are always distinguishable. Perhaps surprisingly, this analysis extends to quantum mechanics: even according to quantum mechanics there can be distinguishable particles of the same kind. Our most important general conclusion will accordingly be that the universally accepted notion that quantum particles of the same kind are necessarily indistinguishable rests on a confusion about how particles are represented in quantum theory.

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