

AGPhil 5: Quantum Particles

Time: Wednesday 10:00–10:45

Location: BEY 154

Invited Talk

AGPhil 5.1 Wed 10:00 BEY 154

Distinguishable Quantum Particles and the Gibbs Paradox

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The Gibbs paradox in classical statistical mechanics has often 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. However, further thinking about the paradox shows that classical particles are always *distinguishable*. Perhaps surprisingly, this analysis extends to quantum mechanics: even according to quantum mechanics there exist distinguishable particles of the same kind. 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.