

Key concepts

1. **Gibbs paradox, its resolution and consequences for the partition function**
2. **Properties of classical ideal gases from the partition function**
3. **Classical phase space, Liouville, equipartition and virial theorems**
4. **Quantum phase space, volume of a single eigenstate, the density matrix**
5. **Relations between microcanonical, canonical and grand-canonical ensembles (classical and quantum points of view)**
6. **Ideal Fermi gas and its properties at $T=0$**
7. **Ideal Bose gas and BEC condensation**
8. **Para-, dia-, and ferro-magnetism from the statistical physics standpoint**
9. **Classical limit of quantum statistical physics**
10. **Phase transitions, universality and scaling**