Synopsis - Classical versus Quantum statistical physics.
Classical formulation for gas of N particles ($\Lambda_N = 1/N!h^{3N}$)

	Classical Statistical Physics	**Quantum Statistical Physics**
observable	phase space function $A(p,q)$	Hermitian operator $\hat{A}$
density	density function $\rho(p,q)$	density matrix $\hat{\rho}$
sum / integral	phase space integral $\Lambda_N \int dp\, dq \cdots$	trace over Hilbertspace $tr(\cdots)$
renormalized density	$\Lambda_N \int dp\, dq\ \rho(p,q) = 1$	$tr(\hat{\rho}) = 1$
statistical average	$\langle A \rangle = \Lambda_N \int dp\, dq\ \rho(p,q) A(p,q)$	$\langle \hat{A} \rangle = tr(\hat{\rho}\hat{A})$
Liouville's theorem	$\frac{\partial \rho}{\partial t} = \{\mathcal{H}, \rho\}$ (Poisson bracket)	$\frac{\partial \hat{\rho}}{\partial t} = -\frac{i}{\hbar}[\mathcal{H}, \hat{\rho}]$ (commutator)
stationary ensembles	$\{\mathcal{H}, \rho\} = 0$	$[\mathcal{H}, \hat{\rho}] = 0$