Chapter 3.2: The Ideal classical Gas in the Canonical Ensemble

Independent particles $\{\vec{r}_1, \vec{p}_1, \vec{r}_2, \vec{p}_2, \vec{r}_3, \vec{p}_3, ..., \vec{r}_N, \vec{p}_N\}$

$$\varepsilon(\{\vec{r}_j, \vec{p}_j\}) = \sum_j \frac{\vec{p}_j^{\,2}}{2m}$$

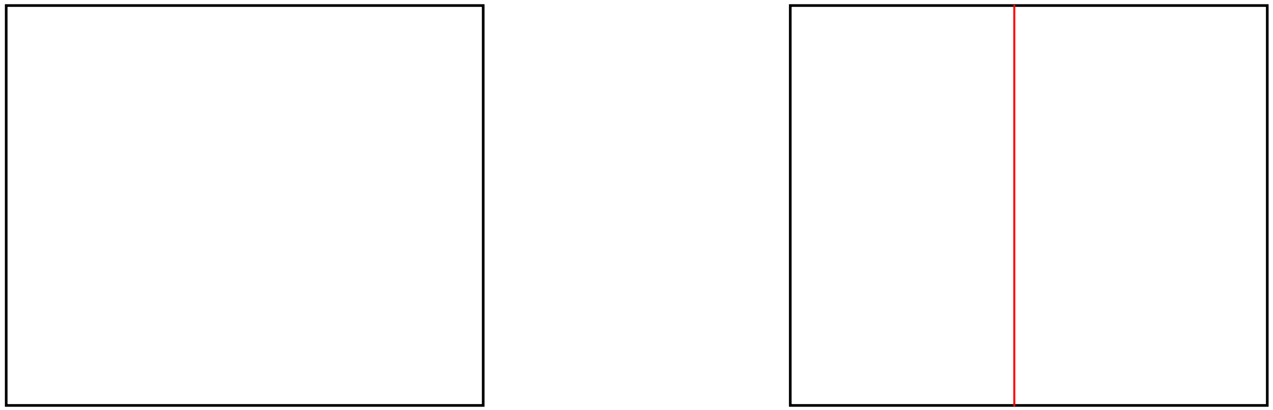
$Z = (Z_1)^N$

Summary: Microcanonical vs. Canonical Ensemble

Microcanonical ensemble	Canonical ensemble

3.2-2 The Ideal Gas in the Canonical Ensemble

Entropy



Gibbs paradox and Gibbs factor

For indistinguishable particles avoid overcounting by exchanging indices:

$$\int \prod_j d^3\vec{r}_j d^3\vec{p}_j \quad \rightarrow \quad \frac{1}{N!}\int \prod_j d^3\vec{r}_j d^3\vec{p}_j$$

Entropy of mixing