On the origin of gravity and the law of Newton, JHEP 04 (2011) 029

の"エントロピー力"の説明が無茶苦茶

であること.

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Shin-ichi Suea

Γ : microscopic coordinate : $\Gamma = (\mathbf{r}_1, \dots, \mathbf{r}_N, \mathbf{p}_1 \dots \mathbf{p}_N)$

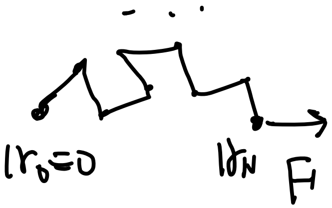
$\mathbf{r} = (x, y, z)$

$H_0(\Gamma)$: Hamiltonian for a polymer

$$\Omega(E, x) \equiv \int d\Gamma\, \delta(H_0(\Gamma) - E) \cdot \delta(x_N - x)$$

$\Rightarrow$ (2.1) ok

F : external force



$$Z(T, F) \equiv \int d\Gamma\, e^{-\beta(H_0(\Gamma) - F x_N)}$$

$$= \int d\Gamma \int dE\, \delta(H_0(\Gamma) - E) \int dx\, \delta(x_N - x)\, e^{-\beta(H_0(\Gamma) - F x_N)}$$

$$= \int dE\, dx\, e^{-\beta(E - Fx)}\, \Omega(E, x)$$

(2.2) の F の前の符号は誤り

microcanonical ensemble (E, x) fixed

F_{el} : 復元力

$$\Rightarrow \quad dS = \frac{1}{T} dE + \frac{F_{el}}{T} dx$$

∴

e.g. $\quad F_{el} = -\left\langle \frac{\partial H_0}{\partial x_N} \right\rangle^{mc}_{E, x}$

(2.3) は誤り

$(\because F + F_{el} = 0)$

Microcanonical ensemble (with E_{tot}, F : fixed)
による変分原理の導出

設定 $\begin{cases} H(P) = H_0(P) - F x_N = E_{tot} : \text{fix} \\ F : \text{fix} \end{cases}$

$$\rho(x) = \int dP \frac{\delta(H_0(P) - F x_N - E_{tot})}{\tilde{\Omega}(E_{tot}, F)} \delta(x_N - x)$$

$$= \frac{1}{\tilde{\Omega}(E_{tot}, F)} \int dP\, \delta(H_0(P) - (E_{tot} + F x)) \cdot \delta(x_N - x)$$

$$= \frac{1}{\tilde{\Omega}(E_{tot}, F)} \Omega(E_{tot} + F x, x)$$

$$= \text{const}\ e^{\frac{1}{k_B} S(E_{tot} + F x, x)}$$

よって x を決める変分原理は $\underline{\frac{d}{dx} S(E_{tot} + F x, x) = 0}$

(2-4)式は解説でないレベルで
全くの意味不明.