

場の量子論 p281check10.7

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1 本文

$$x_P = \sum_{i=1}^N \frac{x_i}{N} \quad (1)$$

$$\frac{\partial V}{\partial x_P} = \sum_{i=1}^N \frac{\partial x_i}{\partial x_P} \frac{\partial V}{\partial x_i} \quad (2)$$

$$= N \sum_{i=1}^N \frac{\partial V}{\partial x_i} \quad (3)$$

$$= 0 \quad (4)$$

$$\sum_{i=1}^N \frac{\partial V}{\partial x_i} = 0 \quad (5)$$

$$X_1 = x_1 - x_2, X_2 = x_2 - x_3, \dots, X_{N-1} = x_{N-1} - x_N, X_N = x_N$$

$$\frac{\partial V}{\partial x_P} = \sum_{i=1}^N \frac{\partial X_i}{\partial x_P} \frac{\partial V}{\partial X_i} \quad (6)$$

$$= (N - N) \sum_{i=1}^{N-1} \frac{\partial V}{\partial X_i} + N \frac{\partial V}{\partial X_N} \quad (7)$$

$$= 0 \quad (8)$$

$$\frac{\partial V}{\partial X_N} = 0 \quad (9)$$

参考文献

[1] 坂本眞人著「場の量子論-不変性と自由場を中心にして」(裳華房,2014,ISBN9784785325114)