

場の量子論 p199check7.6

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$$\mathrm{tr}\{T^a T^a\} = \frac{1}{4}\mathrm{tr}\{E_2\} = \frac{1}{2} \quad (1)$$

$$\mathrm{tr}\{T^1 T^2\} = \frac{1}{4}\mathrm{tr}\{\sigma^1 \sigma^2\} = \frac{1}{4}\mathrm{tr}\{i\sigma^3\} = 0 \quad (2)$$

$$\mathrm{tr}\{T^2 T^3\} = \frac{1}{4}\mathrm{tr}\{\sigma^2 \sigma^3\} = \frac{1}{4}\mathrm{tr}\{i\sigma^1\} = 0 \quad (3)$$

$$\mathrm{tr}\{T^3 T^1\} = \frac{1}{4}\mathrm{tr}\{\sigma^3 \sigma^1\} = \frac{1}{4}\mathrm{tr}\{i\sigma^2\} = 0 \quad (4)$$

$$[T^a, T^a] = 0 \quad (5)$$

$$[T^1, T^2] = \frac{1}{4}(\sigma^1 \sigma^2 - \sigma^2 \sigma^1) = \frac{1}{4}(i\sigma^3 + i\sigma^3) = i\frac{1}{2}\sigma^3 = iT^3 \quad (6)$$

$$[T^2, T^3] = \frac{1}{4}(\sigma^2 \sigma^3 - \sigma^3 \sigma^2) = \frac{1}{4}(i\sigma^1 + i\sigma^1) = i\frac{1}{2}\sigma^1 = iT^1 \quad (7)$$

$$[T^3, T^1] = \frac{1}{4}(\sigma^3 \sigma^1 - \sigma^1 \sigma^3) = \frac{1}{4}(i\sigma^2 + i\sigma^2) = i\frac{1}{2}\sigma^2 = iT^2 \quad (8)$$

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)