Tugas Pak Ridwan

Date

$$\hat{B} = \int B_p(\alpha,\alpha^*)\,|\alpha\rangle\langle\alpha|\,d^2\alpha$$

Maka

$$\langle\hat{B}\rangle = Tr(\hat{B}\hat{\rho})$$
$$= \sum_n \langle n| \int B_p(\alpha,\alpha^*)|\alpha\rangle\langle\alpha|\hat{\rho}|n\rangle\, d^2\alpha$$

dimana rata" $\hat{B}$

$$\langle\hat{B}\rangle = Tr(\hat{\rho}\hat{B})$$
$$= \sum_n \langle n| \int \hat{\rho} B_p(\alpha,\alpha^*)|\alpha\rangle\langle\alpha| d^2\alpha\, |n\rangle$$
$$= \int B_p(\alpha,\alpha^*)\, d^2\alpha \sum_n \langle n|\hat{\rho}|\alpha\rangle\langle\alpha|n\rangle$$
$$= \int B_p(\alpha,\alpha^*)\, d^2\alpha \sum_n \langle n|n\rangle\langle n|\hat{\rho}|\alpha\rangle$$
$$\langle\hat{B}\rangle = \int B_p(\alpha,\alpha^*)\langle\alpha|\hat{\rho}|\alpha\rangle\, d^2\alpha.$$

nilai Ekspetasi dari density Operator terhadap Coherent States = distribusi phase Space probability

$$Q(\alpha) = \frac{1}{\pi}\langle\alpha|\hat{\rho}|\alpha\rangle$$

$$Tr(\hat{B}) = \int Q(\alpha)\, d^2\alpha = 1$$

Maka

$$\hat{B} = \hat{1}\hat{B}\hat{1}$$
$$= \sum_n |n\rangle\langle n|\hat{B}\sum_m |m\rangle\langle m|$$
$$= \sum_n\sum_m |n\rangle\langle n|\hat{B}|m\rangle\langle m|$$
$$\hat{B} = \sum_n\sum_m |n\rangle\hat{B}_{nm}\langle m|$$

OKEY

Date

Lalu di Masukkan nilai Ekspetasi dan Coherent State atau Q representation berikut.

$$\langle\alpha|\hat{B}|\alpha| = \langle\alpha| \left(\sum_n \sum_m |n\rangle \hat{B}_{nm} \langle m|\right) |\alpha\rangle$$

$$= \left(\sum_n \sum_m \langle\alpha|n\rangle \langle m|\alpha\rangle\right)$$

$$= \sum_n \sum_m e^{-1/2|\alpha|^2} \sum_l \frac{(\alpha^*)^l}{\sqrt{l!}} \langle l|n\rangle \hat{B}_{nm}$$

$$\langle m| e^{-1/2|\alpha|^2} \sum_l \frac{(\alpha)}{\sqrt{l!}} |l\rangle$$

$$= e^{-1/2|\alpha|^2} \sum_n \frac{(\alpha^*)^n}{\sqrt{n!}} \delta_{nm} \hat{B}_{nm} e^{-1/2|\alpha|^2} \sum_m \frac{(\alpha)^m}{\sqrt{m!}} \delta_{mm}$$

$$B_Q(\alpha,\alpha^*) = e^{-|\alpha|^2} \sum_n \sum_m \frac{(\alpha)^m (\alpha^*)^n}{\sqrt{m!n!}} \hat{B}_{nm}$$

Maka nilai Operator $\hat{B}$ untuk $\hat{\rho}$ dalam P-representation

$$\langle\hat{B}\rangle = Tr(\hat{\rho}\hat{B})$$

$$= Tr\left(\int P(\alpha)|\alpha\rangle\langle\alpha| d^2\alpha . \hat{B}\right)$$

$$= \sum_n \langle n| \int P(\alpha\rangle \langle\alpha| d^2\alpha . \hat{B}|n\rangle$$

$$= \int P(\alpha) \sum_n \langle n|\hat{B}|\alpha\rangle \langle\alpha|n\rangle d^2\alpha$$

$$= \int P(\alpha) \sum_n \langle\alpha|n\rangle\langle n|\hat{B}|\alpha\rangle d^2\alpha$$

$$= \int P(\alpha) \langle\alpha|\hat{B}|\alpha\rangle d^2\alpha$$

$$\langle\hat{B}\rangle = \int P(\alpha) B_Q(\alpha,\alpha^*) d^2\alpha$$

OKEY