

**MPF1204, FISIKA KUANTUM (3 SKS)**  
**Program Studi S2 Pendidikan Fisika**



**FAKULTAS KEGURUAN DAN ILMU  
PENDIDIKAN  
UNIVERSITAS SEBELAS MARET (UNS)  
SURAKARTA**

**Homeworks e Learning :**

# **The Expansion Postulate and Operator Methods in Quantum Mechanics**

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**Pertemuan ke-11 :**  
**Juma't, 8 Mei 2020 TM online Pk. 13.00 wib**

**DR. Suharno, M.Si**



# Exercises: (at paper),

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1. Use the general operator equation (6-53) to Calculate  $\langle n|x^2|n\rangle$  and  $\langle n|p^2|n\rangle$ .

$$x = \sqrt{\frac{\hbar}{2m\omega}} (A + A^+)$$
$$p = i\sqrt{\frac{m\omega\hbar}{2}} (A^+ - A)$$

2. Use the general operator equation of motion (6-67) to solve for the time dependence of the operator  $x(t)$  given that

$$H = \frac{p^2(t)}{2m} + mgx(t)$$



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Thank you