3-8

$$|\psi_i\rangle = \sum_i |\phi_i\rangle\langle\phi_i|\psi_i\rangle = |\phi_1\rangle\langle\phi_1|\psi_i\rangle + |\phi_2\rangle\langle\phi_2|\psi_i\rangle + |\phi_3\rangle\langle\phi_3|\psi_i\rangle = \frac{i}{\sqrt{3}}|\phi_1\rangle + \sqrt{\frac{2}{3}}|\phi_2\rangle$$

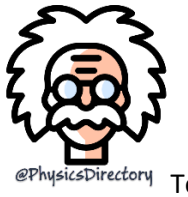
$$|\psi_f\rangle = \sum_i |\phi_i\rangle\langle\phi_i|\psi_f\rangle = |\phi_1\rangle\langle\phi_1|\psi_f\rangle + |\phi_2\rangle\langle\phi_2|\psi_f\rangle + |\phi_3\rangle\langle\phi_3|\psi_f\rangle$$

$$= \frac{1+i}{\sqrt{3}}|\phi_1\rangle + \sqrt{\frac{1}{6}}|\phi_2\rangle + \sqrt{\frac{1}{6}}|\phi_3\rangle$$

$$P = |\langle\psi_f|\psi_i\rangle|^2 = \left(\frac{1-i}{\sqrt{3}}\langle\phi_1| + \sqrt{\frac{1}{6}}\langle\phi_2| + \sqrt{\frac{1}{6}}\langle\phi_3|\right)\left(\frac{i}{\sqrt{3}}|\phi_1\rangle + \sqrt{\frac{2}{3}}|\phi_2\rangle\right) = \left|\frac{1-i}{\sqrt{3}}\frac{i}{\sqrt{3}} + \sqrt{\frac{1}{6}}\sqrt{\frac{2}{3}}\right|^2$$

$$= \left|\frac{1+i}{3} + \frac{1}{3}\right|^2 = \left|\frac{2+i}{3}\right|^2 = \frac{2^2+1^2}{3^2} = \frac{5}{9}$$

Mohammad Behtaj & Adel Sepehri

Translate by: 

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