

Phy403 Quantum Mechanics
Fifth and last Homework Assignment
Due Friday June 6

Problem 1. Consider a nucleon-pion system. The nucleon has two states:

$$\begin{aligned} \textit{proton} &: \quad \left| \frac{1}{2} \frac{1}{2} \right\rangle \\ \textit{neutron} &: \quad \left| \frac{1}{2} -\frac{1}{2} \right\rangle \end{aligned}$$

The pion has three states:

$$\begin{aligned} \pi^+ &: \quad |1 \ 1\rangle \\ \pi^0 &: \quad |1 \ 0\rangle \\ \pi^- &: \quad |1 \ -1\rangle \end{aligned}$$

with corresponding isospin states. Express the following particle states in the isospin basis:

$$|p \ \pi^+\rangle \quad |p \ \pi^-\rangle \quad |n \ \pi^0\rangle$$

Problem 2. Problem 10.4 (page 382)

Problem 3. Problem 10.5 (page 382)