

1 Measurement Probabilities

A beam of spin- $\frac{1}{2}$ particles is prepared in the initial state

$$|\psi\rangle = \sqrt{\frac{2}{5}} |+\rangle_x - \sqrt{\frac{3}{5}} |-\rangle_x$$

(Note: this state is written in the S_x basis!)

- (a) What are the possible results of a measurement of S_x , with what probabilities?
- (b) Repeat part a for measurements of S_z .
- (c) Suppose you start with a particle in the state given above, measure S_x , and happen to get $+\hbar/2$. You then take that same particle and measure S_z . What are the possible results and with what probability would you measure each possible result?