Questions (meeting 4)

Theme: symmetry of the lagrangian vs. symmetry of the states

1. What are the consequences of manifest symmetry? (The vacuum state is a singlet.)

2. What are the consequences of a spontaneously broken discrete symmetry? Of a spontaneously broken continuous symmetry?

3. When a ferromagnet magnetizes, what symmetry is broken? Do you expect Goldstone bosons? How many? What are they called?

4. Suppose that in the SU(2) example in the book, the scalar had been in the vector rather than the spinor irrep of the group, and suppose it had vev $\begin{pmatrix} 0 \\ 0 \\ v \end{pmatrix}$. Would there still be 3 Goldstone bosons?

5. Does a crystal break translation invariance? Are there Goldstone bosons? What are they called?

6. How does the level spacing for the rotational states of a chair compare with the energy of visible photons used to see the chair?