Questions (meeting 6)

Theme: Yet another realization of lagrangian symmetry.

1. What are the realizations that we have already seen?

2. Does the U(1) Higgs lagrangian of Eq. 3.102 have any apparent internal symmetry?

3. For that U(1) Higgs model $\langle 0|\phi|0\rangle = v$ with v real. Let Q be that charge operator that generates the global U(1) symmetry that is manifest for the theory when it is written in terms of the original fields. What is the action of Q on the vacuum of $\langle 0|\phi|0\rangle = v$?

a) $Q|0\rangle = 0$.
b) $Q|0\rangle = q|0\rangle$.
c) $Q|0\rangle \neq 0$ but neither a nor b.

4. Consider the SU(2) gauge theory with the scalar carrying the three dimensional irrep. Suppose that

$$\langle 0|\varphi|0\rangle = \begin{pmatrix} 0 \\ 0 \\ v \end{pmatrix}$$ with v real.

a) How many massless vector bosons?
b) How many massive vector bosons?
c) How many Higgs bosons?
d) How many other scalar bosons?
e) What are the Q_3 charges of all the particles?