$\Delta_{\mathcal{D}}$ has universal eigenvalues on $\mathcal{D}$ which depend only on the structural invariants of G and H. The quadratic Casimir operator

$$C^{(2)} = - \sum_f I_f I_f \tag{32}$$

is normalized by the structure constants c_{kem} in eq. (22)

$$C^{(2)}_{\mathcal{D}} = - h^r_f \partial_{z^r} h^s_f \partial_{z^s} = - k_1 \Delta_{\mathcal{D}} \tag{33}$$

$k_1 > 0$ and in particular Q are structural constants of G, H. Only for the correct discrete set of values of Q spontaneous curvature can arise. We conclude

$$Q = 0(1)$$

unless the number of scalar fields becomes very large.

From (33) it follows

$$h^r_f h^s_f = k_1 R^{-1} g^{rs}$$

Furthermore

$$\int d^D z \sqrt{|g|} = L^D \cdot k_2 \quad (< \infty) \tag{34}$$

k_2 : structural constant of G, H.

Thus we obtain the effective action of the vector bosons:

$$S^{(W)}_{eff} = - \frac{1}{4} \left[\Theta(\varphi) L^{D+2} \frac{D}{\delta} k_1 k_2 \right] \int d^4x \left(W^f_{\mu\nu} W^{\mu\nu f} \right) \tag{35}$$

Besides R (or L) there exists a second spontaneous constant determining the normalization of the spherical functions φ_α, which due to the homogeneity of the equations of motion with respect to φ remains arbitrary in the absence of quantum effects. We set