

Propagators

Fermions

Quarks  $\begin{array}{c} i \longrightarrow j \\ \hline p \end{array} = \frac{i(\not{p} + m_q) \delta_{color}^{ij}}{p^2 - m_q^2 + i\epsilon}$

Leptons  $\begin{array}{c} \longrightarrow \\ \hline p \end{array} = \frac{i(\not{p} + m_l)}{p^2 - m_l^2 + i\epsilon}$

Gauge bosons (R<sub>ξ</sub> gauge)

Photon:  $\begin{array}{c} \mu \text{ wavy } \nu \\ \hline q \end{array} = \frac{-i}{q^2 + i\epsilon} \left( g^{\mu\nu} - (1-\xi) \frac{q^\mu q^\nu}{q^2 + i\epsilon} \right)$

Gluon:  $\begin{array}{c} \mu \text{ wavy } \nu \\ \hline a \text{ b} \end{array} = \frac{-i \delta_{color}^{ab}}{q^2 + i\epsilon} \left( g^{\mu\nu} - (1-\xi) \frac{q^\mu q^\nu}{q^2 + i\epsilon} \right) \quad V = \{W^\pm, Z\}$

W<sup>±</sup>/Z:  $\begin{array}{c} \mu \text{ wavy } \nu \\ \hline \end{array} = \frac{-i}{q^2 - m_V^2 + i\epsilon} \left( g^{\mu\nu} - \frac{q^\mu q^\nu}{m_V^2} \right) + \frac{-i}{q^2 - \xi m_V^2} \frac{q^\mu q^\nu}{m_V^2}$

Higgs / Goldstone

Higgs  $\begin{array}{c} \xrightarrow{p} \\ \hline \end{array} = \frac{i}{p^2 - m_H^2 + i\epsilon}$

Goldstone  $\begin{array}{c} \xrightarrow{p} \\ \hline \end{array} = \frac{i}{p^2 - \xi m_V^2 + i\epsilon} \quad V = \{W^\pm, Z\}$   
(φ<sup>±</sup>/φ<sub>Z</sub>)

Ghosts:

η<sub>A</sub>:  $\begin{array}{c} \text{dotted} \xrightarrow{p} \text{dotted} \\ \hline \end{array} = \frac{i}{p^2 + i\epsilon}$

η<sub>G</sub>:  $\begin{array}{c} a \text{ dotted } b \\ \hline \end{array} = \frac{i \delta^{ab}}{p^2 + i\epsilon}$

η<sup>±</sup>:  $\begin{array}{c} \text{dotted} \xrightarrow{p} \text{dotted} \\ \hline \end{array} = \frac{i}{p^2 - \xi m_W^2 + i\epsilon}$

η<sub>Z</sub>:  $\begin{array}{c} \text{dotted} \xrightarrow{p} \text{dotted} \\ \hline \end{array} = \frac{i}{p^2 - \xi m_Z^2 + i\epsilon}$