In[235]:= **Mneut[[Range[1, 7], 1]] // Simplify // MatrixForm**

Out[235]//MatrixForm=

$$\begin{pmatrix} \frac{1}{4} \left(4\, \text{mH1}^2 + 3\, \text{g2}^2\, \text{v1}^2 - \text{g2}^2\, \text{v2}^2 + 4\, \text{v2}^2\, \kappa 0^2 + 4\, \kappa 0^2\, \sigma S^2 + \text{g2}^2\, \sigma v[1]^2 + \text{g2}^2\, \sigma v[2]^2 + \text{g2}^2\, \sigma v[3]^2 + \text{g1}^2 \left(3\, \text{v1}^2 - \text{v2}^2 + \sigma v[1]^2 + \sigma v[2]^2 + \sigma v[3]^2 \right) \right) \\ \frac{1}{2} \left(-\text{g1}^2\, \text{v1}\, \text{v2} - \text{g2}^2\, \text{v1}\, \text{v2} + 4\, \text{v1}\, \text{v2}\, \kappa 0^2 - 2\, \text{A0}\, \sigma S - \kappa 0\, \kappa 3\, \sigma S^2 - \kappa 0\, \kappa 2\, \sigma n[3]^2 \right) \\ -\text{A0}\, \text{v2} - \kappa 0 \left(-2\, \text{v1}\, \kappa 0\, \sigma S + \text{v2}\, \kappa 3\, \sigma S + \sigma n[3] \left(\kappa 1[1]\, \sigma v[1] + \kappa 1[2]\, \sigma v[2] + \kappa 1[3]\, \sigma v[3] \right) \right) \\ \frac{1}{2} \left(-2\, \kappa 0\, \sigma S\, \kappa 1[1]\, \sigma n[3] + \left(\text{g1}^2 + \text{g2}^2 \right) \text{v1}\, \sigma v[1] \right) \\ \frac{1}{2} \left(-2\, \kappa 0\, \sigma S\, \kappa 1[2]\, \sigma n[3] + \left(\text{g1}^2 + \text{g2}^2 \right) \text{v1}\, \sigma v[2] \right) \\ \frac{1}{2} \left(-2\, \kappa 0\, \sigma S\, \kappa 1[3]\, \sigma n[3] + \left(\text{g1}^2 + \text{g2}^2 \right) \text{v1}\, \sigma v[3] \right) \\ -\kappa 0 \left(\text{v2}\, \kappa 2\, \sigma n[3] + \sigma S \left(\kappa 1[1]\, \sigma v[1] + \kappa 1[2]\, \sigma v[2] + \kappa 1[3]\, \sigma v[3] \right) \right) \end{pmatrix}$$

In[236]:= **Mneut[[Range[1, 7], 2]] // Simplify // MatrixForm**

Out[236]//MatrixForm=

$$\begin{pmatrix} \frac{1}{2} \left(-\text{g1}^2\, \text{v1}\, \text{v2} - \text{g2}^2\, \text{v1}\, \text{v2} + 4\, \text{v1}\, \text{v2}\, \kappa 0^2 - 2\, \text{A0}\, \sigma S - \kappa 0\, \kappa 3\, \sigma S^2 - \kappa 0\, \kappa 2\, \sigma n[3]^2 \right) \\ \frac{1}{2} \left(2\, \text{mH2}^2 + \text{g1}^2\, \text{v2}^2 + \text{g2}^2\, \text{v2}^2 + 2\, \text{v1}^2\, \kappa 0^2 + 2\, \kappa 0^2\, \sigma S^2 + 2\, \kappa 1[1]^2\, \sigma n[3]^2 + 2\, \kappa 1[2]^2\, \sigma n[3]^2 + 2\, \kappa 1[3]^2\, \sigma n[3]^2 + 2 \left(\kappa 1[1]\, \sigma v[1] + \kappa 1[2]\, \sigma v[2] + \kappa 1[3]\, \sigma v[3] \right)^2 - \frac{1}{2}\, \text{g1}^2 \left(\text{v} \right. \\ -\text{A0}\, \text{v1} + 2\, \text{v2}\, \kappa 0^2\, \sigma S - \text{v1}\, \kappa 0\, \kappa 3\, \sigma S + \kappa 2\, \kappa 1[1]\, \sigma n[3]\, \sigma v[1] + \kappa 2\, \kappa 1[2]\, \sigma n[3]\, \sigma v[2] + \kappa 2\, \kappa 1[3]\, \sigma n[3]\, \sigma v[3] \\ \text{A1}[1]\, \sigma n[3] + \kappa 2\, \sigma S\, \kappa 1[1]\, \sigma n[3] - \frac{1}{2}\, \text{v2} \left(\text{g1}^2\, \sigma v[1] + \text{g2}^2\, \sigma v[1] - 4\, \kappa 1[1] \left(\kappa 1[1]\, \sigma v[1] + \kappa 1[2]\, \sigma v[2] + \kappa 1[3]\, \sigma v[3] \right) \right) \\ \text{A1}[2]\, \sigma n[3] + \kappa 2\, \sigma S\, \kappa 1[2]\, \sigma n[3] + \frac{1}{2}\, \text{v2} \left(4\, \kappa 1[1]\, \kappa 1[2]\, \sigma v[1] - \text{g1}^2\, \sigma v[2] - \text{g2}^2\, \sigma v[2] + 4\, \kappa 1[2]^2\, \sigma v[2] + 4\, \kappa 1[2]\, \kappa 1[3]\, \sigma v[3] \right) \\ \text{A1}[3]\, \sigma n[3] + \kappa 2\, \sigma S\, \kappa 1[3]\, \sigma n[3] + \frac{1}{2}\, \text{v2} \left(4\, \kappa 1[1]\, \kappa 1[3]\, \sigma v[1] + 4\, \kappa 1[2]\, \kappa 1[3]\, \sigma v[2] - \left(\text{g1}^2 + \text{g2}^2 - 4\, \kappa 1[3]^2 \right) \sigma v[3] \right) \\ -\text{v1}\, \kappa 0\, \kappa 2\, \sigma n[3] + 2\, \text{v2} \left(\kappa 1[1]^2 + \kappa 1[2]^2 + \kappa 1[3]^2 \right) \sigma n[3] + \text{A1}[1]\, \sigma v[1] + \kappa 2\, \sigma S\, \kappa 1[1]\, \sigma v[1] + \text{A1}[2]\, \sigma v[2] + \kappa 2\, \sigma S\, \kappa 1[2]\, \sigma v[2] + \text{A1}[3]\, \sigma v[3] + \kappa 2\, \sigma S\, \kappa 1[3]\, \sigma v[3] \end{pmatrix}$$

In[237]:= **Mneut[[Range[1, 7], 3]] // Simplify // MatrixForm**

Out[237]//MatrixForm=

$$\begin{pmatrix} -\text{A0}\, \text{v2} - \kappa 0 \left(-2\, \text{v1}\, \kappa 0\, \sigma S + \text{v2}\, \kappa 3\, \sigma S + \sigma n[3] \left(\kappa 1[1]\, \sigma v[1] + \kappa 1[2]\, \sigma v[2] + \kappa 1[3]\, \sigma v[3] \right) \right) \\ -\text{A0}\, \text{v1} + 2\, \text{v2}\, \kappa 0^2\, \sigma S - \text{v1}\, \kappa 0\, \kappa 3\, \sigma S + \kappa 2\, \kappa 1[1]\, \sigma n[3]\, \sigma v[1] + \kappa 2\, \kappa 1[2]\, \sigma n[3]\, \sigma v[2] + \kappa 2\, \kappa 1[3]\, \sigma n[3]\, \sigma v[3] \\ \text{MS}^2 + \text{v1}^2\, \kappa 0^2 + \text{v2}^2\, \kappa 0^2 - \text{v1}\, \text{v2}\, \kappa 0\, \kappa 3 + \text{A3}\, \sigma S + \frac{3\, \kappa 3^2\, \sigma S^2}{2} + \kappa 2^2\, \sigma n[3]^2 + \frac{1}{2}\, \kappa 2\, \kappa 3\, \sigma n[3]^2 \\ \left(-\text{v1}\, \kappa 0 + \text{v2}\, \kappa 2 \right) \kappa 1[1]\, \sigma n[3] \\ \left(-\text{v1}\, \kappa 0 + \text{v2}\, \kappa 2 \right) \kappa 1[2]\, \sigma n[3] \\ \left(-\text{v1}\, \kappa 0 + \text{v2}\, \kappa 2 \right) \kappa 1[3]\, \sigma n[3] \\ \text{A2}\, \sigma n[3] + 2\, \kappa 2^2\, \sigma S\, \sigma n[3] - \text{v1}\, \kappa 0 \left(\kappa 1[1]\, \sigma v[1] + \kappa 1[2]\, \sigma v[2] + \kappa 1[3]\, \sigma v[3] \right) + \kappa 2 \left(\kappa 3\, \sigma S\, \sigma n[3] + \text{v2}\, \kappa 1[1]\, \sigma v[1] + \text{v2}\, \kappa 1[2]\, \sigma v[2] + \text{v2}\, \kappa 1[3]\, \sigma v[3] \right) \end{pmatrix}$$

In[238]:= **Mneut[[Range[1, 7], 4]] // Simplify // MatrixForm**

Out[238]//MatrixForm=

$$
\begin{pmatrix}
\frac{1}{2}\left(-2\,\kappa 0\,\sigma S\,\kappa 1[1]\,\sigma n[3] + \left(g1^2 + g2^2\right)v1\,\sigma v[1]\right) \\
A1[1]\,\sigma n[3] + \kappa 2\,\sigma S\,\kappa 1[1]\,\sigma n[3] - \frac{1}{2}\,v2\left(g1^2\,\sigma v[1] + g2^2\,\sigma v[1] - 4\,\kappa 1[1]\left(\kappa 1[1]\,\sigma v[1] + \kappa 1[2]\,\sigma v[2] + \kappa 1[3]\,\sigma v[3]\right)\right) \\
(-v1\,\kappa 0 + v2\,\kappa 2)\,\kappa 1[1]\,\sigma n[3] \\
\frac{1}{4}\left(4\left(ML[1,1]^2 + \kappa 1[1]^2\left(v2^2 + \sigma n[3]^2\right)\right) + g1^2\left(v1^2 - v2^2 + 3\,\sigma v[1]^2 + \sigma v[2]^2 + \sigma v[3]^2\right) + g2^2\left(v1^2 - v2^2 + 3\,\sigma v[1]^2 + \sigma v[2]^2 + \sigma v[3]^2\right)\right) \\
ML[1,2]^2 + v2^2\,\kappa 1[1]\,\kappa 1[2] + \kappa 1[1]\,\kappa 1[2]\,\sigma n[3]^2 + \frac{1}{2}\,g1^2\,\sigma v[1]\,\sigma v[2] + \frac{1}{2}\,g2^2\,\sigma v[1]\,\sigma v[2] \\
ML[1,3]^2 + v2^2\,\kappa 1[1]\,\kappa 1[3] + \kappa 1[1]\,\kappa 1[3]\,\sigma n[3]^2 + \frac{1}{2}\,g1^2\,\sigma v[1]\,\sigma v[3] + \frac{1}{2}\,g2^2\,\sigma v[1]\,\sigma v[3] \\
v2\left(A1[1] + \kappa 2\,\sigma S\,\kappa 1[1]\right) + \kappa 1[1]\left(-v1\,\kappa 0\,\sigma S + 2\,\sigma n[3]\left(\kappa 1[1]\,\sigma v[1] + \kappa 1[2]\,\sigma v[2] + \kappa 1[3]\,\sigma v[3]\right)\right)
\end{pmatrix}
$$

In[239]:= **Mneut[[Range[1, 7], 5]] // Simplify // MatrixForm**

Out[239]//MatrixForm=

$$
\begin{pmatrix}
\frac{1}{2}\left(-2\,\kappa 0\,\sigma S\,\kappa 1[2]\,\sigma n[3] + \left(g1^2 + g2^2\right)v1\,\sigma v[2]\right) \\
A1[2]\,\sigma n[3] + \kappa 2\,\sigma S\,\kappa 1[2]\,\sigma n[3] + \frac{1}{2}\,v2\left(4\,\kappa 1[1]\,\kappa 1[2]\,\sigma v[1] - g1^2\,\sigma v[2] - g2^2\,\sigma v[2] + 4\,\kappa 1[2]^2\,\sigma v[2] + 4\,\kappa 1[2]\,\kappa 1[3]\,\sigma v[3]\right) \\
(-v1\,\kappa 0 + v2\,\kappa 2)\,\kappa 1[2]\,\sigma n[3] \\
ML[1,2]^2 + v2^2\,\kappa 1[1]\,\kappa 1[2] + \kappa 1[1]\,\kappa 1[2]\,\sigma n[3]^2 + \frac{1}{2}\,g1^2\,\sigma v[1]\,\sigma v[2] + \frac{1}{2}\,g2^2\,\sigma v[1]\,\sigma v[2] \\
\frac{1}{4}\left(4\left(ML[2,2]^2 + \kappa 1[2]^2\left(v2^2 + \sigma n[3]^2\right)\right) + g1^2\left(v1^2 - v2^2 + \sigma v[1]^2 + 3\,\sigma v[2]^2 + \sigma v[3]^2\right) + g2^2\left(v1^2 - v2^2 + \sigma v[1]^2 + 3\,\sigma v[2]^2 + \sigma v[3]^2\right)\right) \\
ML[2,3]^2 + v2^2\,\kappa 1[2]\,\kappa 1[3] + \kappa 1[2]\,\kappa 1[3]\,\sigma n[3]^2 + \frac{1}{2}\,g1^2\,\sigma v[2]\,\sigma v[3] + \frac{1}{2}\,g2^2\,\sigma v[2]\,\sigma v[3] \\
v2\left(A1[2] + \kappa 2\,\sigma S\,\kappa 1[2]\right) + \kappa 1[2]\left(-v1\,\kappa 0\,\sigma S + 2\,\sigma n[3]\left(\kappa 1[1]\,\sigma v[1] + \kappa 1[2]\,\sigma v[2] + \kappa 1[3]\,\sigma v[3]\right)\right)
\end{pmatrix}
$$

In[240]:= **Mneut[[Range[1, 7], 6]] // Simplify // MatrixForm**

Out[240]//MatrixForm=

$$
\begin{pmatrix}
\frac{1}{2}\left(-2\,\kappa 0\,\sigma S\,\kappa 1[3]\,\sigma n[3] + \left(g1^2 + g2^2\right)v1\,\sigma v[3]\right) \\
A1[3]\,\sigma n[3] + \kappa 2\,\sigma S\,\kappa 1[3]\,\sigma n[3] + \frac{1}{2}\,v2\left(4\,\kappa 1[1]\,\kappa 1[3]\,\sigma v[1] + 4\,\kappa 1[2]\,\kappa 1[3]\,\sigma v[2] - \left(g1^2 + g2^2 - 4\,\kappa 1[3]^2\right)\sigma v[3]\right) \\
(-v1\,\kappa 0 + v2\,\kappa 2)\,\kappa 1[3]\,\sigma n[3] \\
ML[1,3]^2 + v2^2\,\kappa 1[1]\,\kappa 1[3] + \kappa 1[1]\,\kappa 1[3]\,\sigma n[3]^2 + \frac{1}{2}\,g1^2\,\sigma v[1]\,\sigma v[3] + \frac{1}{2}\,g2^2\,\sigma v[1]\,\sigma v[3] \\
ML[2,3]^2 + v2^2\,\kappa 1[2]\,\kappa 1[3] + \kappa 1[2]\,\kappa 1[3]\,\sigma n[3]^2 + \frac{1}{2}\,g1^2\,\sigma v[2]\,\sigma v[3] + \frac{1}{2}\,g2^2\,\sigma v[2]\,\sigma v[3] \\
\frac{1}{4}\left(4\left(ML[3,3]^2 + \kappa 1[3]^2\left(v2^2 + \sigma n[3]^2\right)\right) + g1^2\left(v1^2 - v2^2 + \sigma v[1]^2 + \sigma v[2]^2 + 3\,\sigma v[3]^2\right) + g2^2\left(v1^2 - v2^2 + \sigma v[1]^2 + \sigma v[2]^2 + 3\,\sigma v[3]^2\right)\right) \\
v2\left(A1[3] + \kappa 2\,\sigma S\,\kappa 1[3]\right) + \kappa 1[3]\left(-v1\,\kappa 0\,\sigma S + 2\,\sigma n[3]\left(\kappa 1[1]\,\sigma v[1] + \kappa 1[2]\,\sigma v[2] + \kappa 1[3]\,\sigma v[3]\right)\right)
\end{pmatrix}
$$

In[241]:= **Mneut[[Range[1, 7], 7]] // Simplify // MatrixForm**

Out[241]//MatrixForm=

$$-\kappa 0 \ (\mathbf{v2} \ \kappa 2 \ \sigma n[3] + \sigma S \ (\kappa 1[1] \ \sigma v[1] + \kappa 1[2] \ \sigma v[2] + \kappa 1[3] \ \sigma v[3]))$$

$$-\mathbf{v1} \ \kappa 0 \ \kappa 2 \ \sigma n[3] + 2 \ \mathbf{v2} \ \left(\kappa 1[1]^2 + \kappa 1[2]^2 + \kappa 1[3]^2\right) \sigma n[3] + A1[1] \ \sigma v[1] + \kappa 2 \ \sigma S \ \kappa 1[1] \ \sigma v[1] + A1[2] \ \sigma v[2] + \kappa 2 \ \sigma S \ \kappa 1[2] \ \sigma v[2] + A1[3] \ \sigma v[3] + \kappa 2 \ \sigma S \ \kappa 1[3] \ \sigma v[3]$$

$$A2 \ \sigma n[3] + 2 \ \kappa 2^2 \ \sigma S \ \sigma n[3] - \mathbf{v1} \ \kappa 0 \ (\kappa 1[1] \ \sigma v[1] + \kappa 1[2] \ \sigma v[2] + \kappa 1[3] \ \sigma v[3]) + \kappa 2 \ (\kappa 3 \ \sigma S \ \sigma n[3] + \mathbf{v2} \ \kappa 1[1] \ \sigma v[1] + \mathbf{v2} \ \kappa 1[2] \ \sigma v[2] + \mathbf{v2} \ \kappa 1[3] \ \sigma v[3])$$

$$\mathbf{v2} \ (A1[1] + \kappa 2 \ \sigma S \ \kappa 1[1]) + \kappa 1[1] \ (-\mathbf{v1} \ \kappa 0 \ \sigma S + 2 \ \sigma n[3] \ (\kappa 1[1] \ \sigma v[1] + \kappa 1[2] \ \sigma v[2] + \kappa 1[3] \ \sigma v[3]))$$

$$\mathbf{v2} \ (A1[2] + \kappa 2 \ \sigma S \ \kappa 1[2]) + \kappa 1[2] \ (-\mathbf{v1} \ \kappa 0 \ \sigma S + 2 \ \sigma n[3] \ (\kappa 1[1] \ \sigma v[1] + \kappa 1[2] \ \sigma v[2] + \kappa 1[3] \ \sigma v[3]))$$

$$\mathbf{v2} \ (A1[3] + \kappa 2 \ \sigma S \ \kappa 1[3]) + \kappa 1[3] \ (-\mathbf{v1} \ \kappa 0 \ \sigma S + 2 \ \sigma n[3] \ (\kappa 1[1] \ \sigma v[1] + \kappa 1[2] \ \sigma v[2] + \kappa 1[3] \ \sigma v[3]))$$

$$A2 \ \sigma S + \kappa 2^2 \ \sigma S^2 + MN[3, 3]^2 + \mathbf{v2}^2 \ \kappa 1[1]^2 + \mathbf{v2}^2 \ \kappa 1[2]^2 + \mathbf{v2}^2 \ \kappa 1[3]^2 + \kappa 2^2 \ \sigma n[3]^2 + \frac{1}{2} \ \kappa 2 \ \left(-2 \ \mathbf{v1} \ \mathbf{v2} \ \kappa 0 + \kappa 3 \ \sigma S^2 + \kappa 2 \ \sigma n[3]^2\right) + (\kappa 1[1] \ \sigma v[1] + \kappa 1[2] \ \sigma v[2] + \kappa 1[3] \ \sigma v[3$$