

term-3-all

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^+], \hat{H}_{t, Ni}^0] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^+], \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^+], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^+], \hat{H}_{t, cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^+], \hat{H}_{t, cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^+], \hat{H}_{t, cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^+], \hat{H}_{t, cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^+], \hat{H}_{t, R}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^-], \hat{H}_{t, Ni}^0] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^-], \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^-], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^-], \hat{H}_{t, cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^-], \hat{H}_{t, cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^-], \hat{H}_{t, cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^-], \hat{H}_{t, cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, Ni}^-], \hat{H}_{t, R}] = 0$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, Ni}^0] = & -X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow 0} \\ & -\eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow-\sigma} X_{jN}^{0\leftarrow 0} - X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jN}^{d\leftarrow d} \\ & +\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow\sigma} X_{jN}^{d\leftarrow d} - X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow 0} \\ & -\eta(\sigma) X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow-\sigma} - X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} \\ & +\eta(\sigma) X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow\sigma} \end{aligned}$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, Ni}^+] = 0$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, Ni}^-] = & +\eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{jN}^{0\leftarrow 0} X_{iR}^{-\sigma\leftarrow 0} \\ & -\eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} - X_{iN}^{\sigma\leftarrow d} X_{jN}^{0\leftarrow 0} X_{iR}^{d\leftarrow\sigma} \\ & +X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow d} X_{iR}^{d\leftarrow\sigma} +\eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{jN}^{-\sigma\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} \\ & -X_{iN}^{\sigma\leftarrow d} X_{jN}^{-\sigma\leftarrow-\sigma} X_{iR}^{d\leftarrow\sigma} -\eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{jN}^{\sigma\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} \\ & +X_{iN}^{-\sigma\leftarrow d} X_{jN}^{\sigma\leftarrow-\sigma} X_{iR}^{d\leftarrow\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, cross}^{0\oplus}] = & -\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{0\leftarrow\sigma} \\ & -\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{0\leftarrow\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, cross}^{0\ominus}] = & +X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow\sigma} \\ & +X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} + X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} \\ & +X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} + X_{iN}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow 0} X_{jN}^{0\leftarrow\sigma} \\ & +X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow\sigma} - X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} \\ & +X_{iN}^{-\sigma\leftarrow d} X_{iR}^{0\leftarrow 0} X_{jN}^{d\leftarrow-\sigma} - X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow\sigma} \\ & +X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} \end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, cross}^{+\ominus}] &= -\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} \\
&\quad + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{d\leftarrow-\sigma} + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow-d} X_{jN}^{d\leftarrow-\sigma} \\
&\quad - \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow\sigma} + \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{0\leftarrow\sigma} \\
&\quad + \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow0} X_{jN}^{0\leftarrow\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, cross}^{-\oplus}] &= -X_{iN}^{\sigma\leftarrow d} X_{jN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow0} \\
&\quad - X_{iN}^{\sigma\leftarrow d} X_{jN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow0}
\end{aligned}$$

[illegible]

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, Ni}^0] = & -X_{iN}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow\sigma} X_{jN}^{\sigma\leftarrow\sigma} \\
& -\eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} X_{jN}^{\sigma\leftarrow\sigma} - X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} X_{jN}^{\sigma\leftarrow\sigma} \\
& +\eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jN}^{\sigma\leftarrow\sigma} - X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow 0} X_{iR}^{0\leftarrow\sigma} \\
& -\eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} - X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{d\leftarrow d} X_{iR}^{0\leftarrow-\sigma} \\
& +\eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{d\leftarrow d} X_{iR}^{\sigma\leftarrow d}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, Ni}^+] = & +\eta(\sigma) X_{jN}^{-\sigma\leftarrow-\sigma} X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow-\sigma} \\
& -\eta(\sigma) X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-\sigma} - X_{jN}^{-\sigma\leftarrow-\sigma} X_{iN}^{d\leftarrow\sigma} X_{iR}^{\sigma\leftarrow d} \\
& +X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow d} +\eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} \\
& -X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow d} -\eta(\sigma) X_{jN}^{d\leftarrow 0} X_{iN}^{0\leftarrow\sigma} X_{iR}^{0\leftarrow-\sigma} \\
& +X_{jN}^{d\leftarrow 0} X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow d}
\end{aligned}$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, Ni}^-] = 0$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{0\oplus}] = & +X_{jN}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow\sigma} X_{iR}^{0\leftarrow 0} \\
& +X_{jN}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} - X_{jN}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow\sigma} \\
& +X_{jN}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow 0} - X_{jN}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow\sigma} X_{iR}^{\sigma\leftarrow-\sigma} \\
& +X_{jN}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} + X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0} \\
& +X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{\sigma\leftarrow 0} + X_{iN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{\sigma\leftarrow 0} \\
& +X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{\sigma\leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{0\ominus}] = & -\eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow d} X_{jN}^{\sigma\leftarrow 0} \\
& -\eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow d} X_{jN}^{\sigma\leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{+\ominus}] = & -X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow d} X_{jN}^{\sigma\leftarrow 0} \\
& -X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow d} X_{jN}^{\sigma\leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{-\oplus}] = & -\eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0} \\
& +\eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{0\leftarrow 0} X_{jN}^{\sigma\leftarrow 0} +\eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0} \\
& -\eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d} +\eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{d\leftarrow d} X_{jN}^{-\sigma\leftarrow d} \\
& +\eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d}
\end{aligned}$$



$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, Ni}^0] = & -X_{iN}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow d} \\
& -\eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-\sigma} X_{jN}^{d\leftarrow d} - X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow d} X_{jN}^{0\leftarrow-0} \\
& +\eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-\sigma} X_{jN}^{0\leftarrow-0} - X_{jN}^{-\sigma\leftarrow-\sigma} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow d} \\
& -\eta(\sigma) X_{jN}^{-\sigma\leftarrow-\sigma} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-\sigma} - X_{jN}^{-\sigma\leftarrow-\sigma} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow d} \\
& +\eta(\sigma) X_{jN}^{-\sigma\leftarrow-\sigma} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-\sigma}
\end{aligned}$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, Ni}^+] = 0$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, Ni}^-] = & +\eta(\sigma) X_{iN}^{-\sigma\leftarrow-0} X_{jN}^{d\leftarrow d} X_{iR}^{\sigma\leftarrow d} \\
& -\eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow-0} X_{iR}^{\sigma\leftarrow d} - X_{iN}^{-\sigma\leftarrow-0} X_{jN}^{d\leftarrow d} X_{iR}^{0\leftarrow-\sigma} \\
& +X_{iN}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow-0} X_{iR}^{0\leftarrow-\sigma} +\eta(\sigma) X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{-\sigma\leftarrow-0} X_{iR}^{\sigma\leftarrow d} \\
& -X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{-\sigma\leftarrow-0} X_{iR}^{0\leftarrow-\sigma} -\eta(\sigma) X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{\sigma\leftarrow-0} X_{iR}^{\sigma\leftarrow d} \\
& +X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{\sigma\leftarrow-0} X_{iR}^{0\leftarrow-\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, cross}^{0\oplus}] = & -\eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow-\sigma} \\
& +\eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{0\leftarrow-\sigma} +\eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-0} X_{jN}^{0\leftarrow-\sigma} \\
& -\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} +\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{d\leftarrow-\sigma} \\
& +\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{d\leftarrow-\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, cross}^{0\ominus}] = & -X_{iN}^{-\sigma\leftarrow-0} X_{jN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow d} \\
& -X_{iN}^{-\sigma\leftarrow-0} X_{jN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow d}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, cross}^{+\ominus}] = & -\eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow d} X_{jN}^{d\leftarrow-\sigma} \\
& -\eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow d} X_{jN}^{d\leftarrow-\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, cross}^{-\oplus}] = & +X_{iN}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} \\
& +X_{iN}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-0} +X_{iN}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} \\
& +X_{iN}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-0} +X_{iN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow d} X_{jN}^{d\leftarrow-\sigma} \\
& +X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} -X_{iN}^{-\sigma\leftarrow-0} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow-\sigma} \\
& +X_{iN}^{\sigma\leftarrow-0} X_{iR}^{d\leftarrow d} X_{jN}^{0\leftarrow-\sigma} -X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{d\leftarrow-\sigma} \\
& +X_{iN}^{\sigma\leftarrow-0} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow-\sigma}
\end{aligned}$$





$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, Ni}^0] = & -X_{iN}^{-\sigma \leftarrow d} X_{iR}^{d \leftarrow -\sigma} X_{jN}^{-\sigma \leftarrow -\sigma} \\
& -\eta(\sigma) X_{iN}^{-\sigma \leftarrow d} X_{iR}^{\sigma \leftarrow 0} X_{jN}^{-\sigma \leftarrow -\sigma} - X_{iN}^{\sigma \leftarrow d} X_{iR}^{d \leftarrow -\sigma} X_{jN}^{-\sigma \leftarrow -\sigma} \\
& +\eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{iR}^{-\sigma \leftarrow 0} X_{jN}^{-\sigma \leftarrow -\sigma} - X_{iN}^{\sigma \leftarrow d} X_{jN}^{0 \leftarrow 0} X_{iR}^{d \leftarrow -\sigma} \\
& +\eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{jN}^{0 \leftarrow 0} X_{iR}^{-\sigma \leftarrow 0} - X_{iN}^{-\sigma \leftarrow d} X_{jN}^{d \leftarrow d} X_{iR}^{d \leftarrow -\sigma} \\
& -\eta(\sigma) X_{iN}^{-\sigma \leftarrow d} X_{jN}^{d \leftarrow d} X_{iR}^{\sigma \leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, Ni}^+] = & +\eta(\sigma) X_{jN}^{\sigma \leftarrow \sigma} X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{d \leftarrow \sigma} \\
& -\eta(\sigma) X_{jN}^{\sigma \leftarrow -\sigma} X_{iN}^{0 \leftarrow \sigma} X_{iR}^{d \leftarrow -\sigma} - X_{jN}^{\sigma \leftarrow \sigma} X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow 0} \\
& +X_{jN}^{\sigma \leftarrow -\sigma} X_{iN}^{0 \leftarrow \sigma} X_{iR}^{-\sigma \leftarrow 0} +\eta(\sigma) X_{jN}^{d \leftarrow d} X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{d \leftarrow -\sigma} \\
& -X_{jN}^{d \leftarrow d} X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow 0} -\eta(\sigma) X_{iN}^{d \leftarrow -\sigma} X_{jN}^{0 \leftarrow d} X_{iR}^{d \leftarrow -\sigma} \\
& +X_{iN}^{d \leftarrow -\sigma} X_{jN}^{0 \leftarrow d} X_{iR}^{-\sigma \leftarrow 0}
\end{aligned}$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, Ni}^-] = 0$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{0\oplus}] = & -X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{d \leftarrow 0} X_{jN}^{-\sigma \leftarrow d} \\
& -X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{d \leftarrow 0} X_{jN}^{-\sigma \leftarrow d}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{0\ominus}] = & -\eta(\sigma) X_{iN}^{-\sigma \leftarrow 0} X_{iR}^{\sigma \leftarrow -\sigma} X_{jN}^{-\sigma \leftarrow d} \\
& +\eta(\sigma) X_{iN}^{\sigma \leftarrow 0} X_{iR}^{d \leftarrow d} X_{jN}^{-\sigma \leftarrow d} +\eta(\sigma) X_{iN}^{\sigma \leftarrow 0} X_{iR}^{-\sigma \leftarrow -\sigma} X_{jN}^{-\sigma \leftarrow d} \\
& -\eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{iR}^{-\sigma \leftarrow \sigma} X_{jN}^{\sigma \leftarrow 0} +\eta(\sigma) X_{iN}^{-\sigma \leftarrow d} X_{iR}^{0 \leftarrow 0} X_{jN}^{\sigma \leftarrow 0} \\
& +\eta(\sigma) X_{iN}^{-\sigma \leftarrow d} X_{iR}^{\sigma \leftarrow \sigma} X_{jN}^{\sigma \leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{+\ominus}] = & +X_{jN}^{\sigma \leftarrow 0} X_{iN}^{0 \leftarrow \sigma} X_{iR}^{d \leftarrow d} \\
& -X_{jN}^{\sigma \leftarrow 0} X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow \sigma} +X_{jN}^{\sigma \leftarrow 0} X_{iN}^{0 \leftarrow \sigma} X_{iR}^{-\sigma \leftarrow -\sigma} \\
& +X_{jN}^{-\sigma \leftarrow d} X_{iN}^{d \leftarrow -\sigma} X_{iR}^{d \leftarrow d} +X_{jN}^{-\sigma \leftarrow d} X_{iN}^{d \leftarrow -\sigma} X_{iR}^{\sigma \leftarrow \sigma} \\
& -X_{jN}^{-\sigma \leftarrow d} X_{iN}^{d \leftarrow \sigma} X_{iR}^{\sigma \leftarrow -\sigma} +X_{iN}^{d \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow -\sigma} X_{jN}^{-\sigma \leftarrow d} \\
& +X_{iN}^{d \leftarrow -\sigma} X_{iR}^{0 \leftarrow 0} X_{jN}^{-\sigma \leftarrow d} +X_{iN}^{d \leftarrow -\sigma} X_{iR}^{\sigma \leftarrow \sigma} X_{jN}^{-\sigma \leftarrow d} \\
& +X_{iN}^{d \leftarrow -\sigma} X_{iR}^{0 \leftarrow 0} X_{jN}^{-\sigma \leftarrow d}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^0, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{-\oplus}] = & -\eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{iR}^{d \leftarrow 0} X_{jN}^{-\sigma \leftarrow d} \\
& -\eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{iR}^{d \leftarrow 0} X_{jN}^{-\sigma \leftarrow d}
\end{aligned}$$

[illegible]

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, R}], \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, R}], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, R}], \hat{H}_{t, cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, R}], \hat{H}_{t, cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, R}], \hat{H}_{t, cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, R}], \hat{H}_{t, cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^0, \hat{H}_{t, R}], \hat{H}_{t, R}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, Ni}^-], \hat{H}_{t, Ni}^0] = 0$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^+, \hat{H}_{t, Ni}^-], \hat{H}_{t, Ni}^+] &= +\eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{jN}^{0\leftarrow\sigma} \\ &\quad -\eta(\sigma)X_{iN}^{d\leftarrow\sigma}X_{jN}^{0\leftarrow-\sigma} - \eta(\sigma)X_{iN}^{d\leftarrow\sigma}X_{jN}^{0\leftarrow-\sigma} \\ &\quad +\eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{jN}^{0\leftarrow\sigma} + \eta(\sigma)X_{jN}^{d\leftarrow-\sigma}X_{iN}^{0\leftarrow\sigma} \\ &\quad -\eta(\sigma)X_{jN}^{d\leftarrow\sigma}X_{iN}^{0\leftarrow-\sigma} - \eta(\sigma)X_{jN}^{d\leftarrow\sigma}X_{iN}^{0\leftarrow-\sigma} \\ &\quad +\eta(\sigma)X_{jN}^{d\leftarrow-\sigma}X_{iN}^{0\leftarrow\sigma} + \eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{jN}^{0\leftarrow\sigma} \\ &\quad -\eta(\sigma)X_{iN}^{d\leftarrow\sigma}X_{jN}^{0\leftarrow-\sigma} + \eta(\sigma)X_{jN}^{d\leftarrow-\sigma}X_{iN}^{0\leftarrow-\sigma} \\ &\quad -\eta(\sigma)X_{jN}^{d\leftarrow\sigma}X_{iN}^{0\leftarrow-\sigma} - \eta(\sigma)X_{iN}^{d\leftarrow\sigma}X_{jN}^{0\leftarrow-\sigma} \\ &\quad +\eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{jN}^{0\leftarrow\sigma} - \eta(\sigma)X_{jN}^{d\leftarrow-\sigma}X_{iN}^{0\leftarrow-\sigma} \\ &\quad +\eta(\sigma)X_{jN}^{d\leftarrow-\sigma}X_{iN}^{0\leftarrow\sigma} \end{aligned}$$



$$\begin{aligned}
[[\hat{H}_{t, Ni}^+, \hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{-\oplus}] = & -X_{iN}^{\sigma \leftarrow d} X_{jN}^{-\sigma \leftarrow -\sigma} X_{iR}^{d \leftarrow \sigma} \\
& + \eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{jN}^{-\sigma \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow 0} - X_{jN}^{\sigma \leftarrow \sigma} X_{iN}^{-\sigma \leftarrow d} X_{iR}^{d \leftarrow -\sigma} \\
& - \eta(\sigma) X_{jN}^{\sigma \leftarrow \sigma} X_{iN}^{-\sigma \leftarrow d} X_{iR}^{\sigma \leftarrow 0} + X_{iN}^{-\sigma \leftarrow d} X_{jN}^{\sigma \leftarrow -\sigma} X_{iR}^{d \leftarrow \sigma} \\
& - \eta(\sigma) X_{iN}^{-\sigma \leftarrow d} X_{jN}^{\sigma \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow 0} + X_{jN}^{-\sigma \leftarrow \sigma} X_{iN}^{\sigma \leftarrow d} X_{iR}^{d \leftarrow -\sigma} \\
& + \eta(\sigma) X_{jN}^{-\sigma \leftarrow \sigma} X_{iN}^{\sigma \leftarrow d} X_{iR}^{\sigma \leftarrow 0} - X_{iN}^{-\sigma \leftarrow d} X_{iR}^{d \leftarrow -\sigma} X_{jN}^{0 \leftarrow 0} \\
& + X_{iN}^{-\sigma \leftarrow 0} X_{iR}^{d \leftarrow -\sigma} X_{jN}^{0 \leftarrow d} - \eta(\sigma) X_{iN}^{-\sigma \leftarrow d} X_{iR}^{\sigma \leftarrow 0} X_{jN}^{0 \leftarrow 0} \\
& - X_{iN}^{\sigma \leftarrow d} X_{iR}^{d \leftarrow \sigma} X_{jN}^{0 \leftarrow 0} + X_{iN}^{\sigma \leftarrow 0} X_{iR}^{d \leftarrow \sigma} X_{jN}^{0 \leftarrow d} \\
& + \eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{iR}^{-\sigma \leftarrow 0} X_{jN}^{0 \leftarrow 0}
\end{aligned}$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, Ni}^-, \hat{H}_{t, R}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\oplus}, \hat{H}_{t, Ni}^0] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\oplus}, \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\oplus}, \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\oplus}, \hat{H}_{t, cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\oplus}, \hat{H}_{t, cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\oplus}, \hat{H}_{t, cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\oplus}, \hat{H}_{t, cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\oplus}, \hat{H}_{t, R}] = 0$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\ominus}, \hat{H}_{t, Ni}^0] = & + \eta(\sigma) X_{iN}^{d \leftarrow \sigma} X_{jN}^{0 \leftarrow 0} X_{iR}^{0 \leftarrow -\sigma} \\
& - X_{iN}^{d \leftarrow \sigma} X_{jN}^{0 \leftarrow 0} X_{iR}^{\sigma \leftarrow d} + \eta(\sigma) X_{jN}^{d \leftarrow 0} X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{0 \leftarrow \sigma} \\
& + X_{jN}^{d \leftarrow 0} X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow d} + \eta(\sigma) X_{jN}^{-\sigma \leftarrow -\sigma} X_{iN}^{d \leftarrow \sigma} X_{iR}^{0 \leftarrow -\sigma} \\
& - X_{jN}^{-\sigma \leftarrow -\sigma} X_{iN}^{d \leftarrow \sigma} X_{iR}^{\sigma \leftarrow d} + \eta(\sigma) X_{jN}^{\sigma \leftarrow -\sigma} X_{iN}^{d \leftarrow \sigma} X_{iR}^{0 \leftarrow \sigma} \\
& + X_{jN}^{\sigma \leftarrow -\sigma} X_{iN}^{d \leftarrow \sigma} X_{iR}^{-\sigma \leftarrow d}
\end{aligned}$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, Ni}^+] = 0$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, Ni}^-] = & -X_{iN}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow\sigma} X_{jN}^{d\leftarrow d} \\ & + X_{iN}^{\sigma\leftarrow d} X_{iR}^{0\leftarrow\sigma} X_{jN}^{d\leftarrow 0} - \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow d} \\ & - X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} X_{jN}^{d\leftarrow d} + X_{iN}^{-\sigma\leftarrow d} X_{iR}^{0\leftarrow-\sigma} X_{jN}^{d\leftarrow 0} \\ & + \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jN}^{d\leftarrow d} - X_{iN}^{\sigma\leftarrow 0} X_{jN}^{-\sigma\leftarrow-\sigma} X_{iR}^{0\leftarrow\sigma} \\ & - \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{jN}^{-\sigma\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow d} - X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} \\ & + \eta(\sigma) X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow d} + X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{-\sigma\leftarrow-\sigma} X_{iR}^{0\leftarrow\sigma} \\ & + \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{\sigma\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow d} + X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} \\ & - \eta(\sigma) X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow d} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{0\oplus}] = & + \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{jN}^{0\leftarrow\sigma} X_{iR}^{0\leftarrow 0} \\ & - \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow-\sigma} + \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{jN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow\sigma} \\ & + \eta(\sigma) X_{jN}^{d\leftarrow-\sigma} X_{iN}^{0\leftarrow\sigma} X_{iR}^{0\leftarrow 0} + \eta(\sigma) X_{jN}^{d\leftarrow-\sigma} X_{iN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} \\ & - \eta(\sigma) X_{jN}^{d\leftarrow-\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow\sigma} + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} \\ & + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{d\leftarrow-\sigma} + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{d\leftarrow-\sigma} \\ & + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{d\leftarrow-\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{0\ominus}] = & -X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow d} X_{jN}^{d\leftarrow-\sigma} \\ & - X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow d} X_{jN}^{d\leftarrow-\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{+\ominus}] = & -\eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow d} X_{jN}^{d\leftarrow-\sigma} \\ & - \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow d} X_{jN}^{d\leftarrow-\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{-\oplus}] = & -X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} \\ & + X_{iN}^{-\sigma\leftarrow d} X_{iR}^{0\leftarrow 0} X_{jN}^{d\leftarrow-\sigma} + X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} \\ & - X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow\sigma} + X_{iN}^{\sigma\leftarrow 0} X_{iR}^{d\leftarrow d} X_{jN}^{0\leftarrow\sigma} \\ & + X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow\sigma} \end{aligned}$$

[illegible]

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, R}] = 0$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, Ni}^0] = & + \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow d} X_{iR}^{d\leftarrow-\sigma} \\ & + X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow d} X_{iR}^{\sigma\leftarrow 0} + \eta(\sigma) X_{jN}^{d\leftarrow d} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow\sigma} \\ & - X_{jN}^{d\leftarrow d} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} + \eta(\sigma) X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow\sigma} \\ & - X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} + \eta(\sigma) X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow-\sigma} \\ & + X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow 0} \end{aligned}$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, Ni}^+] = 0$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, Ni}^-] = & - X_{iN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow-\sigma} X_{jN}^{0\leftarrow 0} \\ & + X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{d\leftarrow-\sigma} X_{jN}^{0\leftarrow d} - \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow 0} \\ & - X_{iN}^{\sigma\leftarrow d} X_{iR}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow 0} + X_{iN}^{\sigma\leftarrow 0} X_{iR}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow d} \\ & + \eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} X_{jN}^{0\leftarrow 0} - X_{iN}^{\sigma\leftarrow d} X_{jN}^{-\sigma\leftarrow-\sigma} X_{iR}^{d\leftarrow\sigma} \\ & + \eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{jN}^{-\sigma\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} - X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow-\sigma} \\ & - \eta(\sigma) X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow 0} + X_{iN}^{-\sigma\leftarrow d} X_{jN}^{\sigma\leftarrow-\sigma} X_{iR}^{d\leftarrow\sigma} \\ & - \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{jN}^{\sigma\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} + X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{\sigma\leftarrow d} X_{iR}^{d\leftarrow-\sigma} \\ & + \eta(\sigma) X_{jN}^{-\sigma\leftarrow\sigma} X_{iN}^{\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow 0} \end{aligned}$$



$$\begin{aligned}
[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{0\oplus}] &= -\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{0\leftarrow-\sigma} \\
&\quad - \eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{0\leftarrow-\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{0\ominus}] &= -X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow-\sigma} \\
&\quad + X_{iN}^{\sigma\leftarrow 0} X_{iR}^{d\leftarrow d} X_{jN}^{0\leftarrow-\sigma} + X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow-\sigma} \\
&\quad - X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} + X_{iN}^{-\sigma\leftarrow d} X_{iR}^{0\leftarrow 0} X_{jN}^{d\leftarrow-\sigma} \\
&\quad + X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{+\ominus}] &= +\eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{jN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow d} \\
&\quad + \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{jN}^{0\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow-\sigma} - \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow-\sigma} \\
&\quad + \eta(\sigma) X_{jN}^{d\leftarrow-\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow d} - \eta(\sigma) X_{jN}^{d\leftarrow-\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} \\
&\quad + \eta(\sigma) X_{jN}^{d\leftarrow-\sigma} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} + \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow-\sigma} \\
&\quad + \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow 0} X_{jN}^{0\leftarrow-\sigma} + \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow-\sigma} \\
&\quad + \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow 0} X_{jN}^{0\leftarrow-\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^+, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{-\oplus}] &= -X_{iN}^{\sigma\leftarrow d} X_{iR}^{d\leftarrow 0} X_{jN}^{0\leftarrow-\sigma} \\
&\quad - X_{iN}^{\sigma\leftarrow d} X_{iR}^{d\leftarrow 0} X_{jN}^{0\leftarrow-\sigma}
\end{aligned}$$

[illegible]

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, R}], \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, R}], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, R}], \hat{H}_{t, cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, R}], \hat{H}_{t, cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, R}], \hat{H}_{t, cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, R}], \hat{H}_{t, cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^+, \hat{H}_{t, R}], \hat{H}_{t, R}] = 0$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, Ni}^0] = & + \eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{jN}^{-\sigma \leftarrow \sigma} X_{iR}^{\sigma \leftarrow 0} \\ & + X_{iN}^{\sigma \leftarrow d} X_{jN}^{-\sigma \leftarrow \sigma} X_{iR}^{d \leftarrow -\sigma} + \eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{jN}^{-\sigma \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow 0} \\ & - X_{iN}^{\sigma \leftarrow d} X_{jN}^{-\sigma \leftarrow -\sigma} X_{iR}^{d \leftarrow \sigma} + \eta(\sigma) X_{iN}^{\sigma \leftarrow d} X_{jN}^{0 \leftarrow 0} X_{iR}^{-\sigma \leftarrow 0} \\ & - X_{iN}^{\sigma \leftarrow d} X_{jN}^{0 \leftarrow 0} X_{iR}^{d \leftarrow \sigma} + \eta(\sigma) X_{iN}^{-\sigma \leftarrow 0} X_{jN}^{0 \leftarrow d} X_{iR}^{\sigma \leftarrow 0} \\ & + X_{iN}^{-\sigma \leftarrow 0} X_{jN}^{0 \leftarrow d} X_{iR}^{d \leftarrow -\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, Ni}^+] = & - X_{iN}^{0 \leftarrow \sigma} X_{iR}^{\sigma \leftarrow 0} X_{jN}^{-\sigma \leftarrow -\sigma} \\ & + X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{\sigma \leftarrow 0} X_{jN}^{-\sigma \leftarrow \sigma} - \eta(\sigma) X_{iN}^{0 \leftarrow \sigma} X_{iR}^{d \leftarrow -\sigma} X_{jN}^{-\sigma \leftarrow -\sigma} \\ & + \eta(\sigma) X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{d \leftarrow -\sigma} X_{jN}^{-\sigma \leftarrow \sigma} - X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow 0} X_{jN}^{\sigma \leftarrow \sigma} \\ & + X_{iN}^{0 \leftarrow \sigma} X_{iR}^{-\sigma \leftarrow 0} X_{jN}^{\sigma \leftarrow -\sigma} + \eta(\sigma) X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{d \leftarrow \sigma} X_{jN}^{\sigma \leftarrow \sigma} \\ & - \eta(\sigma) X_{iN}^{0 \leftarrow \sigma} X_{iR}^{d \leftarrow \sigma} X_{jN}^{\sigma \leftarrow -\sigma} - X_{jN}^{d \leftarrow d} X_{iN}^{0 \leftarrow \sigma} X_{iR}^{\sigma \leftarrow 0} \\ & - \eta(\sigma) X_{jN}^{d \leftarrow d} X_{iN}^{0 \leftarrow \sigma} X_{iR}^{d \leftarrow -\sigma} - X_{jN}^{d \leftarrow d} X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{-\sigma \leftarrow 0} \\ & + \eta(\sigma) X_{jN}^{d \leftarrow d} X_{iN}^{0 \leftarrow -\sigma} X_{iR}^{d \leftarrow \sigma} + X_{iN}^{d \leftarrow \sigma} X_{jN}^{0 \leftarrow d} X_{iR}^{\sigma \leftarrow 0} \\ & + X_{iN}^{d \leftarrow -\sigma} X_{jN}^{0 \leftarrow d} X_{iR}^{-\sigma \leftarrow 0} \end{aligned}$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, cross}^{0\oplus}] = -X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} \\ - X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{-\sigma\leftarrow d}$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, cross}^{0\ominus}] = +\eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} \\ + \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow d} + \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow-\sigma} \\ + \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow d} + \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} \\ + \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d} - \eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0} \\ + \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{0\leftarrow 0} X_{jN}^{\sigma\leftarrow 0} - \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d} \\ + \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0}$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, cross}^{+\ominus}] = -X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0} \\ + X_{iN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{\sigma\leftarrow 0} + X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{\sigma\leftarrow 0} \\ - X_{iN}^{d\leftarrow\sigma} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d} + X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{-\sigma\leftarrow d} \\ + X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow 0} X_{jN}^{-\sigma\leftarrow d}$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\oplus}], \hat{H}_{t, cross}^{-\oplus}] = -\eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{jN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow 0} \\ - \eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{jN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow 0}$$



$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{0\ominus}], \hat{H}_{t, R}] = 0$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, Ni}^0] = & + \eta(\sigma) X_{jN}^{\sigma\leftarrow-\sigma} X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} \\ & + X_{jN}^{\sigma\leftarrow-\sigma} X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow\sigma} + \eta(\sigma) X_{jN}^{\sigma\leftarrow-\sigma} X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow d} \\ & - X_{jN}^{\sigma\leftarrow\sigma} X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{d\leftarrow d} X_{iR}^{\sigma\leftarrow d} \\ & - X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{d\leftarrow d} X_{iR}^{0\leftarrow-\sigma} + \eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{jN}^{d\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} \\ & + X_{iN}^{\sigma\leftarrow d} X_{jN}^{d\leftarrow 0} X_{iR}^{0\leftarrow\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, Ni}^+] = & - X_{iN}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jN}^{\sigma\leftarrow\sigma} \\ & + X_{iN}^{d\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jN}^{\sigma\leftarrow-\sigma} - \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow\sigma} X_{jN}^{\sigma\leftarrow\sigma} \\ & + \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow\sigma} X_{jN}^{\sigma\leftarrow-\sigma} - X_{iN}^{d\leftarrow\sigma} X_{iR}^{\sigma\leftarrow d} X_{jN}^{-\sigma\leftarrow-\sigma} \\ & + X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow d} X_{jN}^{-\sigma\leftarrow\sigma} + \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow-\sigma} \\ & - \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow\sigma} - X_{iN}^{d\leftarrow-\sigma} X_{jN}^{0\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} \\ & - \eta(\sigma) X_{iN}^{d\leftarrow-\sigma} X_{jN}^{0\leftarrow 0} X_{iR}^{0\leftarrow\sigma} - X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow d} \\ & + \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} + X_{jN}^{d\leftarrow 0} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow d} \\ & + X_{jN}^{d\leftarrow 0} X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow d} \end{aligned}$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{+\ominus}], \hat{H}_{t, Ni}^-] = 0$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{+\ominus}, \hat{H}_{t, cross}^{0\oplus}] &= -X_{iN}^{d\leftarrow\sigma} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d} \\
&+ X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{-\sigma\leftarrow d} + X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} \\
&- X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0} + X_{iN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{\sigma\leftarrow 0} \\
&+ X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{\sigma\leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{+\ominus}, \hat{H}_{t, cross}^{0\ominus}] &= -\eta(\sigma) X_{jN}^{\sigma\leftarrow 0} X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow d} \\
&- \eta(\sigma) X_{jN}^{\sigma\leftarrow 0} X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow d}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{+\ominus}, \hat{H}_{t, cross}^{+\oplus}] &= -X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow d} X_{jN}^{\sigma\leftarrow 0} \\
&- X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow d} X_{jN}^{\sigma\leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{+\ominus}, \hat{H}_{t, cross}^{-\oplus}] &= +\eta(\sigma) X_{jN}^{\sigma\leftarrow 0} X_{iN}^{-\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow-\sigma} \\
&+ \eta(\sigma) X_{jN}^{\sigma\leftarrow 0} X_{iN}^{-\sigma\leftarrow d} X_{iR}^{0\leftarrow 0} + \eta(\sigma) X_{jN}^{\sigma\leftarrow 0} X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} \\
&+ \eta(\sigma) X_{jN}^{\sigma\leftarrow 0} X_{iN}^{-\sigma\leftarrow d} X_{iR}^{0\leftarrow 0} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow d} X_{jN}^{\sigma\leftarrow 0} \\
&+ \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0} - \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d} \\
&+ \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{d\leftarrow d} X_{jN}^{-\sigma\leftarrow d} - \eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0} \\
&+ \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d}
\end{aligned}$$

[illegible]



$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, cross}^{-\oplus}], \hat{H}_{t, R}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, R}], \hat{H}_{t, Ni}^0] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, R}], \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, R}], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, R}], \hat{H}_{t, cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, R}], \hat{H}_{t, cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t, Ni}^-, \hat{H}_{t, R}], \hat{H}_{t, cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t,Ni}^-, \hat{H}_{t,R}], \hat{H}_{t,cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t,Ni}^-, \hat{H}_{t,R}], \hat{H}_{t,R}] = 0$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{0\ominus}], \hat{H}_{t,Ni}^0] = & + X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{\sigma\leftarrow 0} \\ & + X_{iN}^{0\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{-\sigma\leftarrow 0} + X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{\sigma\leftarrow 0} \\ & + X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{-\sigma\leftarrow 0} - X_{iN}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow 0} X_{jN}^{0\leftarrow\sigma} \\ & - X_{iN}^{\sigma\leftarrow d} X_{iR}^{0\leftarrow 0} X_{jN}^{d\leftarrow\sigma} - X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow\sigma} \\ & - X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{d\leftarrow\sigma} + X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{0\leftarrow\sigma} \\ & + X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{d\leftarrow\sigma} - X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow\sigma} \\ & - X_{iN}^{\sigma\leftarrow 0} X_{jN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} + X_{jN}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow\sigma} X_{iR}^{0\leftarrow 0} \\ & + X_{jN}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} - X_{jN}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow\sigma} X_{iR}^{\sigma\leftarrow-\sigma} \\ & - X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{0\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} - X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow d} \\ & - X_{jN}^{-\sigma\leftarrow 0} X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow-\sigma} + X_{jN}^{\sigma\leftarrow d} X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow 0} \\ & + X_{jN}^{\sigma\leftarrow d} X_{iN}^{d\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{0\ominus}], \hat{H}_{t,Ni}^+] = & + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} \\ & - \eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow\sigma} + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{d\leftarrow-\sigma} \\ & - \eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow d} X_{jN}^{d\leftarrow\sigma} - \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow-\sigma} \\ & + \eta(\sigma) X_{jN}^{d\leftarrow-\sigma} X_{iN}^{0\leftarrow\sigma} X_{iR}^{0\leftarrow 0} + \eta(\sigma) X_{jN}^{d\leftarrow-\sigma} X_{iN}^{0\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} \\ & - \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow-\sigma} X_{iR}^{0\leftarrow 0} - \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{jN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} \\ & + \eta(\sigma) X_{jN}^{d\leftarrow\sigma} X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow-\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{0\ominus}], \hat{H}_{t,Ni}^-] = & - \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} \\ & + \eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{iR}^{0\leftarrow 0} X_{jN}^{-\sigma\leftarrow 0} - \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d} \\ & + \eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow 0} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d} \\ & - \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow 0} - \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} \\ & - \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow d} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow\sigma} \\ & + \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{jN}^{\sigma\leftarrow d} X_{iR}^{d\leftarrow d} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{0\ominus}], \hat{H}_{t,cross}^{0\oplus}] = & + X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow 0} \\ & + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow-\sigma} - \eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow\sigma} \\ & + X_{iN}^{0\leftarrow\sigma} X_{iR}^{\sigma\leftarrow 0} + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow-\sigma} \\ & + \eta(\sigma) X_{iN}^{0\leftarrow\sigma} X_{iR}^{d\leftarrow-\sigma} \end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{0\ominus}] &= -X_{iN}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow\sigma} \\
&\quad - \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow d} \\
&\quad - X_{iN}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow\sigma} - \eta(\sigma) X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} \\
&\quad + \eta(\sigma) X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow d}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{+\ominus}] &= -\eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow-\sigma} \\
&\quad - \eta(\sigma) X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow-\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{-\oplus}] &= +\eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} \\
&\quad - \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,R}] &= +X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow\sigma} \\
&\quad + \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow-\sigma} X_{jR}^{0\leftarrow\sigma} \\
&\quad + X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow-\sigma} X_{jR}^{-\sigma\leftarrow d} - X_{iN}^{\sigma\leftarrow\sigma} X_{iR}^{0\leftarrow\sigma} X_{jR}^{\sigma\leftarrow 0} \\
&\quad - \eta(\sigma) X_{iN}^{\sigma\leftarrow\sigma} X_{iR}^{0\leftarrow\sigma} X_{jR}^{d\leftarrow-\sigma} - \eta(\sigma) X_{iN}^{\sigma\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{\sigma\leftarrow 0} \\
&\quad - X_{iN}^{\sigma\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{d\leftarrow-\sigma} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow\sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{\sigma\leftarrow 0} \\
&\quad + X_{iN}^{-\sigma\leftarrow\sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{d\leftarrow-\sigma} + X_{iN}^{-\sigma\leftarrow\sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow-\sigma} \\
&\quad - \eta(\sigma) X_{iN}^{-\sigma\leftarrow\sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} + X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow\sigma} X_{iN}^{\sigma\leftarrow\sigma} \\
&\quad + \eta(\sigma) X_{iR}^{\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{\sigma\leftarrow\sigma} + \eta(\sigma) X_{iR}^{d\leftarrow-\sigma} X_{jR}^{0\leftarrow\sigma} X_{iN}^{\sigma\leftarrow\sigma} \\
&\quad + X_{iR}^{d\leftarrow-\sigma} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{\sigma\leftarrow\sigma} - X_{jR}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow\sigma} X_{iN}^{0\leftarrow 0} \\
&\quad - X_{jR}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} X_{iN}^{-\sigma\leftarrow\sigma} - \eta(\sigma) X_{jR}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} X_{iN}^{0\leftarrow 0} \\
&\quad - \eta(\sigma) X_{jR}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow\sigma} X_{iN}^{0\leftarrow 0} - \eta(\sigma) X_{jR}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow-\sigma} X_{iN}^{-\sigma\leftarrow\sigma} \\
&\quad - X_{jR}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow d} X_{iN}^{0\leftarrow 0} + \eta(\sigma) X_{iR}^{d\leftarrow-\sigma} X_{jR}^{0\leftarrow-\sigma} X_{iN}^{-\sigma\leftarrow\sigma} \\
&\quad - X_{iR}^{d\leftarrow-\sigma} X_{jR}^{\sigma\leftarrow d} X_{iN}^{-\sigma\leftarrow\sigma}
\end{aligned}$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t, Ni}^0] = 0$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{+\ominus}], \hat{H}_{t,cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{+\ominus}], \hat{H}_{t,cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{+\ominus}], \hat{H}_{t,cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{+\ominus}], \hat{H}_{t,R}] = 0$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t, Ni}^0] &= -X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} \\ &\quad - X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{\sigma\leftarrow d} + X_{iN}^{\sigma\leftarrow d} X_{jN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} \\ &\quad + X_{iN}^{-\sigma\leftarrow d} X_{jN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t, Ni}^+] &= -\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{0\leftarrow-\sigma} \\ &\quad + \eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow 0} X_{jN}^{0\leftarrow-\sigma} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t, Ni}^-] &= +\eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{jN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow 0} \\ &\quad - \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{jN}^{\sigma\leftarrow d} X_{iR}^{d\leftarrow 0} \end{aligned}$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{0\oplus}] = 0$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{0\ominus}] &= +\eta(\sigma) X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} \\ &\quad - \eta(\sigma) X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow 0} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{+\ominus}] &= -\eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow-\sigma} \\ &\quad + \eta(\sigma) X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow-\sigma} \end{aligned}$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{-\oplus}] = 0$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,R}] = & -X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow\sigma} X_{jR}^{\sigma\leftarrow 0} \\
& -\eta(\sigma) X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow\sigma} X_{jR}^{d\leftarrow-\sigma} - X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow-\sigma} X_{jR}^{-\sigma\leftarrow 0} \\
& +\eta(\sigma) X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow-\sigma} X_{jR}^{d\leftarrow\sigma} + \eta(\sigma) X_{jR}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow 0} X_{iN}^{0\leftarrow d} \\
& +X_{jR}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{iN}^{0\leftarrow d} - \eta(\sigma) X_{jR}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow d} \\
& +X_{jR}^{d\leftarrow\sigma} X_{iR}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow d}
\end{aligned}$$

[illegible]

[illegible]

$$\begin{aligned}
[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{0\ominus}] = & + \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow 0} \\
& - X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jR}^{d\leftarrow \sigma} + \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow \sigma} X_{jR}^{0\leftarrow -\sigma} \\
& - X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow \sigma} X_{jR}^{\sigma\leftarrow d} - X_{jR}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow \sigma} X_{iN}^{0\leftarrow 0} \\
& - \eta(\sigma) X_{jR}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} X_{iN}^{0\leftarrow 0} - \eta(\sigma) X_{jR}^{d\leftarrow -\sigma} X_{iR}^{0\leftarrow \sigma} X_{iN}^{0\leftarrow 0} \\
& - X_{jR}^{d\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow d} X_{iN}^{0\leftarrow 0} + \eta(\sigma) X_{iR}^{d\leftarrow \sigma} X_{jR}^{0\leftarrow -\sigma} X_{iN}^{0\leftarrow 0} \\
& - X_{iR}^{d\leftarrow \sigma} X_{jR}^{\sigma\leftarrow d} X_{iN}^{0\leftarrow 0} + \eta(\sigma) X_{jR}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{iN}^{0\leftarrow 0} \\
& - X_{jR}^{d\leftarrow \sigma} X_{iR}^{\sigma\leftarrow d} X_{iN}^{0\leftarrow 0} - X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{0\leftarrow \sigma} X_{jR}^{\sigma\leftarrow 0} \\
& - \eta(\sigma) X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{0\leftarrow \sigma} X_{jR}^{d\leftarrow -\sigma} - X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow 0} \\
& + \eta(\sigma) X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{d\leftarrow \sigma} - X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow 0} \\
& + \eta(\sigma) X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{d\leftarrow \sigma} - \eta(\sigma) X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{\sigma\leftarrow 0} \\
& - X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{d\leftarrow -\sigma} - X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} \\
& + \eta(\sigma) X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} - X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} \\
& + \eta(\sigma) X_{iN}^{\sigma\leftarrow \sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} + X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{\sigma\leftarrow 0} \\
& + \eta(\sigma) X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{d\leftarrow -\sigma} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{\sigma\leftarrow \sigma} X_{jR}^{\sigma\leftarrow d} X_{jR}^{\sigma\leftarrow 0} \\
& + X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{d\leftarrow -\sigma} + X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} \\
& - \eta(\sigma) X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} + X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} \\
& - \eta(\sigma) X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d}
\end{aligned}$$

$$[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{+\ominus}] = 0$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{0\oplus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{-\oplus}] = & - \eta(\sigma) X_{iN}^{0\leftarrow d} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow 0} \\
& + X_{iN}^{0\leftarrow d} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{d\leftarrow \sigma} + X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow \sigma} X_{jR}^{\sigma\leftarrow 0} \\
& + \eta(\sigma) X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow \sigma} X_{jR}^{d\leftarrow -\sigma} + \eta(\sigma) X_{jR}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow 0} X_{iN}^{0\leftarrow d} \\
& + X_{jR}^{d\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{iN}^{0\leftarrow d} - \eta(\sigma) X_{jR}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow d} \\
& + X_{jR}^{d\leftarrow \sigma} X_{iR}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow d}
\end{aligned}$$





$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{+\ominus}], \hat{H}_{t,cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{+\ominus}], \hat{H}_{t,cross}^{+\ominus}] = 0$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{+\ominus}], \hat{H}_{t,cross}^{-\oplus}] &= -\eta(\sigma) X_{iN}^{-\sigma \leftarrow 0} X_{iR}^{\sigma \leftarrow d} \\ &\quad + \eta(\sigma) X_{iN}^{\sigma \leftarrow 0} X_{iR}^{-\sigma \leftarrow d} \end{aligned}$$

$$\begin{aligned} [[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{+\ominus}], \hat{H}_{t,R}] &= +\eta(\sigma) X_{iN}^{d \leftarrow 0} X_{iR}^{0 \leftarrow -\sigma} X_{jR}^{0 \leftarrow \sigma} \\ &\quad + X_{iN}^{d \leftarrow 0} X_{iR}^{0 \leftarrow -\sigma} X_{jR}^{-\sigma \leftarrow d} - \eta(\sigma) X_{iN}^{d \leftarrow 0} X_{iR}^{0 \leftarrow \sigma} X_{jR}^{0 \leftarrow -\sigma} \\ &\quad + X_{iN}^{d \leftarrow 0} X_{iR}^{0 \leftarrow \sigma} X_{jR}^{\sigma \leftarrow d} - X_{iR}^{\sigma \leftarrow d} X_{jR}^{0 \leftarrow \sigma} X_{iN}^{d \leftarrow 0} \\ &\quad - \eta(\sigma) X_{iR}^{\sigma \leftarrow d} X_{jR}^{-\sigma \leftarrow d} X_{iN}^{d \leftarrow 0} - X_{iR}^{-\sigma \leftarrow d} X_{jR}^{0 \leftarrow -\sigma} X_{iN}^{d \leftarrow 0} \\ &\quad + \eta(\sigma) X_{iR}^{-\sigma \leftarrow d} X_{jR}^{\sigma \leftarrow d} X_{iN}^{d \leftarrow 0} \end{aligned}$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t, Ni}^0] = 0$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t, Ni}^+] = 0$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t, Ni}^-] = 0$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{0\oplus}] = 0$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{0\ominus}] = 0$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{+\ominus}] = 0$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{-\oplus}] = 0$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,R}] = 0$$





$$\begin{aligned}
[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,R}, \hat{H}_{t,cross}^{0\oplus}] = & -X_{iN}^{\sigma\leftarrow\sigma} X_{iR}^{0\leftarrow-\sigma} X_{jR}^{-\sigma\leftarrow 0} \\
& + X_{iN}^{\sigma\leftarrow-\sigma} X_{iR}^{0\leftarrow\sigma} X_{jR}^{-\sigma\leftarrow 0} + \eta(\sigma) X_{iN}^{\sigma\leftarrow\sigma} X_{iR}^{0\leftarrow-\sigma} X_{jR}^{d\leftarrow\sigma} \\
& - \eta(\sigma) X_{iN}^{\sigma\leftarrow-\sigma} X_{iR}^{0\leftarrow\sigma} X_{jR}^{d\leftarrow\sigma} + X_{iN}^{\sigma\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow\sigma} \\
& + \eta(\sigma) X_{iN}^{\sigma\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} - X_{iN}^{\sigma\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow-\sigma} \\
& + \eta(\sigma) X_{iN}^{\sigma\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} - X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow\sigma} X_{iN}^{\sigma\leftarrow\sigma} \\
& - \eta(\sigma) X_{iR}^{\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{\sigma\leftarrow\sigma} - \eta(\sigma) X_{iR}^{d\leftarrow-\sigma} X_{jR}^{0\leftarrow\sigma} X_{iN}^{\sigma\leftarrow\sigma} \\
& + \eta(\sigma) X_{iR}^{d\leftarrow\sigma} X_{jR}^{0\leftarrow\sigma} X_{iN}^{\sigma\leftarrow-\sigma} - X_{iR}^{d\leftarrow-\sigma} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{\sigma\leftarrow\sigma} \\
& + X_{iR}^{d\leftarrow\sigma} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{\sigma\leftarrow-\sigma} - X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow-\sigma} X_{iN}^{\sigma\leftarrow\sigma} \\
& + \eta(\sigma) X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} X_{iN}^{\sigma\leftarrow\sigma} - X_{jR}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} X_{iN}^{\sigma\leftarrow\sigma} \\
& + X_{jR}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow\sigma} X_{iN}^{\sigma\leftarrow-\sigma} + \eta(\sigma) X_{jR}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow-\sigma} X_{iN}^{\sigma\leftarrow\sigma} \\
& - \eta(\sigma) X_{jR}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow\sigma} X_{iN}^{\sigma\leftarrow-\sigma} - X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow\sigma} \\
& - \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow 0} \\
& - X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jR}^{d\leftarrow\sigma} + \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow 0} \\
& - X_{iN}^{0\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jR}^{d\leftarrow\sigma} - \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow-\sigma} X_{jR}^{0\leftarrow\sigma} \\
& - X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow-\sigma} X_{jR}^{-\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow\sigma} X_{jR}^{0\leftarrow-\sigma} \\
& - X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow\sigma} X_{jR}^{\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow\sigma} X_{jR}^{0\leftarrow-\sigma} \\
& - X_{iN}^{0\leftarrow 0} X_{iR}^{d\leftarrow\sigma} X_{jR}^{\sigma\leftarrow d}
\end{aligned}$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,R}, \hat{H}_{t,cross}^{0\ominus}] = 0$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,R}, \hat{H}_{t,cross}^{+\ominus}] = & + X_{iN}^{d\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jR}^{0\leftarrow\sigma} \\
& + \eta(\sigma) X_{iN}^{d\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{d\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} X_{jR}^{0\leftarrow\sigma} \\
& + X_{iN}^{d\leftarrow 0} X_{iR}^{0\leftarrow-\sigma} X_{jR}^{-\sigma\leftarrow d} - \eta(\sigma) X_{iN}^{d\leftarrow 0} X_{iR}^{0\leftarrow\sigma} X_{jR}^{0\leftarrow-\sigma} \\
& + X_{iN}^{d\leftarrow 0} X_{iR}^{0\leftarrow\sigma} X_{jR}^{\sigma\leftarrow d} - \eta(\sigma) X_{iN}^{d\leftarrow 0} X_{iR}^{0\leftarrow\sigma} X_{jR}^{0\leftarrow-\sigma} \\
& + X_{iN}^{d\leftarrow 0} X_{iR}^{0\leftarrow\sigma} X_{jR}^{\sigma\leftarrow d}
\end{aligned}$$

$$[[\hat{H}_{t,cross}^{0\ominus}, \hat{H}_{t,R}, \hat{H}_{t,cross}^{-\oplus}] = 0$$

[illegible]

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\oplus}, \hat{H}_{t,cross}^{-\oplus}, \hat{H}_{t,Ni}^0] = & + X_{iN}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{-\sigma\leftarrow d} \\
& + X_{iN}^{d\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} X_{jN}^{\sigma\leftarrow d} + X_{iN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow 0} X_{jN}^{-\sigma\leftarrow d} \\
& + X_{iN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow 0} X_{jN}^{\sigma\leftarrow d} - X_{iN}^{-\sigma\leftarrow d} X_{iR}^{d\leftarrow d} X_{jN}^{d\leftarrow-\sigma} \\
& - X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{d\leftarrow d} X_{jN}^{0\leftarrow-\sigma} - X_{iN}^{-\sigma\leftarrow d} X_{iR}^{\sigma\leftarrow-\sigma} X_{jN}^{d\leftarrow-\sigma} \\
& - X_{iN}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow\sigma} X_{jN}^{0\leftarrow-\sigma} + X_{iN}^{\sigma\leftarrow d} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{d\leftarrow-\sigma} \\
& + X_{iN}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow\sigma} X_{jN}^{0\leftarrow-\sigma} - X_{iN}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} \\
& - X_{iN}^{-\sigma\leftarrow d} X_{jN}^{d\leftarrow-\sigma} X_{iR}^{0\leftarrow 0} - X_{jN}^{\sigma\leftarrow 0} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow\sigma} \\
& + X_{jN}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{d\leftarrow d} + X_{jN}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} \\
& - X_{iN}^{\sigma\leftarrow d} X_{jN}^{d\leftarrow\sigma} X_{iR}^{-\sigma\leftarrow-\sigma} - X_{iN}^{\sigma\leftarrow d} X_{jN}^{d\leftarrow\sigma} X_{iR}^{0\leftarrow 0} \\
& + X_{jN}^{-\sigma\leftarrow 0} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{d\leftarrow d} + X_{jN}^{-\sigma\leftarrow 0} X_{iN}^{0\leftarrow-\sigma} X_{iR}^{\sigma\leftarrow\sigma} \\
& - X_{jN}^{\sigma\leftarrow d} X_{iN}^{d\leftarrow-\sigma} X_{iR}^{-\sigma\leftarrow\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t, Ni}^+] &= +\eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{iR}^{-\sigma\leftarrow-\sigma}X_{jN}^{0\leftarrow\sigma} \\
&\quad -\eta(\sigma)X_{iN}^{d\leftarrow\sigma}X_{iR}^{-\sigma\leftarrow-\sigma}X_{jN}^{0\leftarrow-\sigma} + \eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{iR}^{0\leftarrow-0}X_{jN}^{0\leftarrow\sigma} \\
&\quad -\eta(\sigma)X_{iN}^{d\leftarrow\sigma}X_{iR}^{0\leftarrow-0}X_{jN}^{0\leftarrow-\sigma} + \eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{jN}^{0\leftarrow\sigma}X_{iR}^{d\leftarrow d} \\
&\quad +\eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{jN}^{0\leftarrow\sigma}X_{iR}^{\sigma\leftarrow\sigma} - \eta(\sigma)X_{jN}^{d\leftarrow-\sigma}X_{iN}^{0\leftarrow-\sigma}X_{iR}^{-\sigma\leftarrow\sigma} \\
&\quad +\eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{jN}^{0\leftarrow-\sigma}X_{iR}^{-\sigma\leftarrow\sigma} - \eta(\sigma)X_{jN}^{d\leftarrow\sigma}X_{iN}^{0\leftarrow-\sigma}X_{iR}^{d\leftarrow d} \\
&\quad -\eta(\sigma)X_{jN}^{d\leftarrow\sigma}X_{iN}^{0\leftarrow-\sigma}X_{iR}^{\sigma\leftarrow\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t, Ni}^-] &= -\eta(\sigma)X_{iN}^{-\sigma\leftarrow d}X_{iR}^{d\leftarrow d}X_{jN}^{\sigma\leftarrow 0} \\
&\quad +\eta(\sigma)X_{iN}^{-\sigma\leftarrow 0}X_{iR}^{d\leftarrow d}X_{jN}^{\sigma\leftarrow d} - \eta(\sigma)X_{iN}^{-\sigma\leftarrow d}X_{iR}^{\sigma\leftarrow\sigma}X_{jN}^{\sigma\leftarrow 0} \\
&\quad +\eta(\sigma)X_{iN}^{-\sigma\leftarrow 0}X_{iR}^{\sigma\leftarrow\sigma}X_{jN}^{\sigma\leftarrow d} + \eta(\sigma)X_{iN}^{\sigma\leftarrow d}X_{iR}^{-\sigma\leftarrow\sigma}X_{jN}^{\sigma\leftarrow 0} \\
&\quad -\eta(\sigma)X_{iN}^{\sigma\leftarrow 0}X_{iR}^{-\sigma\leftarrow\sigma}X_{jN}^{\sigma\leftarrow d} - \eta(\sigma)X_{jN}^{\sigma\leftarrow 0}X_{iN}^{-\sigma\leftarrow d}X_{iR}^{-\sigma\leftarrow-\sigma} \\
&\quad -\eta(\sigma)X_{jN}^{\sigma\leftarrow 0}X_{iN}^{-\sigma\leftarrow d}X_{iR}^{0\leftarrow 0} + \eta(\sigma)X_{jN}^{-\sigma\leftarrow 0}X_{iN}^{\sigma\leftarrow d}X_{iR}^{-\sigma\leftarrow-\sigma} \\
&\quad +\eta(\sigma)X_{jN}^{-\sigma\leftarrow 0}X_{iN}^{\sigma\leftarrow d}X_{iR}^{0\leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{0\oplus}] &= -\eta(\sigma)X_{iN}^{0\leftarrow-\sigma}X_{iR}^{d\leftarrow\sigma} \\
&\quad -\eta(\sigma)X_{iN}^{0\leftarrow-\sigma}X_{iR}^{d\leftarrow-\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{0\ominus}] &= +\eta(\sigma)X_{iN}^{-\sigma\leftarrow 0}X_{iR}^{\sigma\leftarrow d} \\
&\quad -\eta(\sigma)X_{iN}^{\sigma\leftarrow 0}X_{iR}^{-\sigma\leftarrow d}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{+\ominus}] &= +X_{iN}^{d\leftarrow-\sigma}X_{iR}^{-\sigma\leftarrow d} \\
&\quad +\eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{iR}^{0\leftarrow\sigma} - \eta(\sigma)X_{iN}^{d\leftarrow\sigma}X_{iR}^{0\leftarrow-\sigma} \\
&\quad +X_{iN}^{d\leftarrow-\sigma}X_{iR}^{-\sigma\leftarrow d} + \eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{iR}^{0\leftarrow\sigma} \\
&\quad +\eta(\sigma)X_{iN}^{d\leftarrow-\sigma}X_{iR}^{0\leftarrow\sigma}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,cross}^{-\oplus}] &= -X_{iN}^{-\sigma\leftarrow d}X_{iR}^{d\leftarrow-\sigma} \\
&\quad -\eta(\sigma)X_{iN}^{-\sigma\leftarrow d}X_{iR}^{\sigma\leftarrow 0} + \eta(\sigma)X_{iN}^{\sigma\leftarrow d}X_{iR}^{-\sigma\leftarrow 0} \\
&\quad -X_{iN}^{-\sigma\leftarrow d}X_{iR}^{d\leftarrow-\sigma} - \eta(\sigma)X_{iN}^{-\sigma\leftarrow d}X_{iR}^{\sigma\leftarrow 0} \\
&\quad +\eta(\sigma)X_{iN}^{\sigma\leftarrow d}X_{iR}^{-\sigma\leftarrow 0}
\end{aligned}$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,cross}^{-\oplus}], \hat{H}_{t,R}] = & + \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{\sigma\leftarrow 0} \\
& + X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{d\leftarrow -\sigma} + X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{\sigma\leftarrow 0} \\
& + \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{d\leftarrow -\sigma} - \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{0\leftarrow -\sigma} \\
& - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow d} - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} \\
& - \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} + X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} \\
& + \eta(\sigma) X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} - \eta(\sigma) X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow 0} \\
& + X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{d\leftarrow -\sigma} - X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} X_{iN}^{d\leftarrow d} \\
& - \eta(\sigma) X_{iR}^{\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow d} - \eta(\sigma) X_{iR}^{d\leftarrow -\sigma} X_{jR}^{0\leftarrow -\sigma} X_{iN}^{d\leftarrow d} \\
& - \eta(\sigma) X_{iR}^{d\leftarrow -\sigma} X_{jR}^{0\leftarrow -\sigma} X_{iN}^{\sigma\leftarrow -\sigma} - X_{iR}^{d\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow d} \\
& - X_{iR}^{d\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{\sigma\leftarrow -\sigma} + X_{jR}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow -\sigma} X_{iN}^{-\sigma\leftarrow -\sigma} \\
& + \eta(\sigma) X_{jR}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} X_{iN}^{-\sigma\leftarrow -\sigma} + \eta(\sigma) X_{jR}^{d\leftarrow -\sigma} X_{iR}^{0\leftarrow -\sigma} X_{iN}^{-\sigma\leftarrow -\sigma} \\
& + X_{jR}^{d\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow d} X_{iN}^{-\sigma\leftarrow -\sigma} - X_{jR}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow -\sigma} X_{iN}^{\sigma\leftarrow -\sigma} \\
& + \eta(\sigma) X_{jR}^{d\leftarrow -\sigma} X_{iR}^{0\leftarrow -\sigma} X_{iN}^{\sigma\leftarrow -\sigma}
\end{aligned}$$



[illegible]

[illegible]

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{0\ominus}] = & + X_{iN}^{d\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{0\leftarrow -\sigma} \\
& - \eta(\sigma) X_{iN}^{d\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{d\leftarrow 0} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{0\leftarrow -\sigma} \\
& + X_{iN}^{d\leftarrow 0} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow d} + X_{iR}^{\sigma\leftarrow d} X_{jR}^{0\leftarrow -\sigma} X_{iN}^{d\leftarrow 0} \\
& + \eta(\sigma) X_{iR}^{\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow 0} + X_{iR}^{-\sigma\leftarrow d} X_{jR}^{0\leftarrow -\sigma} X_{iN}^{d\leftarrow 0} \\
& - \eta(\sigma) X_{iR}^{-\sigma\leftarrow d} X_{jR}^{\sigma\leftarrow d} X_{iN}^{d\leftarrow 0}
\end{aligned}$$

$$[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{+\ominus}] = 0$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{+\ominus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{-\oplus}] = & - X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} \\
& + \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} - X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow 0} \\
& + \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{d\leftarrow \sigma} - X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow \sigma} X_{iN}^{d\leftarrow d} \\
& - \eta(\sigma) X_{iR}^{\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow d} - \eta(\sigma) X_{iR}^{d\leftarrow -\sigma} X_{jR}^{0\leftarrow \sigma} X_{iN}^{d\leftarrow d} \\
& - X_{iR}^{d\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow d} X_{iN}^{d\leftarrow d} - X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} X_{iN}^{d\leftarrow d} \\
& + \eta(\sigma) X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} X_{iN}^{d\leftarrow d} - X_{jR}^{-\sigma\leftarrow 0} X_{iR}^{0\leftarrow -\sigma} X_{iN}^{d\leftarrow d} \\
& + \eta(\sigma) X_{jR}^{d\leftarrow \sigma} X_{iR}^{0\leftarrow -\sigma} X_{iN}^{d\leftarrow d} - \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{0\leftarrow -\sigma} \\
& - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow \sigma} X_{jR}^{0\leftarrow -\sigma} \\
& - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow \sigma} X_{jR}^{\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow \sigma} X_{jR}^{0\leftarrow -\sigma} \\
& - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow \sigma} X_{jR}^{\sigma\leftarrow d} - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{0\leftarrow \sigma} \\
& - \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow 0} \\
& - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{d\leftarrow \sigma} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow 0} \\
& - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{d\leftarrow \sigma} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow \sigma} X_{jR}^{0\leftarrow \sigma} \\
& + X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow \sigma} X_{jR}^{-\sigma\leftarrow d} + X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow \sigma} \\
& + \eta(\sigma) X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{-\sigma\leftarrow d} - \eta(\sigma) X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow 0} \\
& + X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{d\leftarrow \sigma} - \eta(\sigma) X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow 0} \\
& + X_{iN}^{\sigma\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{d\leftarrow \sigma}
\end{aligned}$$

[illegible]

[illegible]

[illegible]

$$\begin{aligned}
[[\hat{H}_{t,cross}^{-\oplus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{0\oplus}] = & + \eta(\sigma) X_{iN}^{0\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow 0} \\
& + X_{iN}^{0\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{d\leftarrow -\sigma} + X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow \sigma} X_{jR}^{\sigma\leftarrow -0} \\
& + \eta(\sigma) X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{d\leftarrow -\sigma} + X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow -0} \\
& - \eta(\sigma) X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{d\leftarrow \sigma} + X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow -0} \\
& - \eta(\sigma) X_{iN}^{0\leftarrow d} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{d\leftarrow \sigma}
\end{aligned}$$

$$[[\hat{H}_{t,cross}^{-\oplus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{0\ominus}] = 0$$

$$\begin{aligned}
[[\hat{H}_{t,cross}^{-\oplus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{+\ominus}] = & + \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow \sigma} X_{jR}^{0\leftarrow -\sigma} \\
& - \eta(\sigma) X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{0\leftarrow -\sigma} - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{d\leftarrow \sigma} X_{jR}^{\sigma\leftarrow -d} \\
& + X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{d\leftarrow -\sigma} X_{jR}^{\sigma\leftarrow d} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{\sigma\leftarrow 0} \\
& + X_{iN}^{-\sigma\leftarrow \sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{d\leftarrow -\sigma} + \eta(\sigma) X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{-\sigma\leftarrow 0} \\
& - X_{iN}^{-\sigma\leftarrow -\sigma} X_{iR}^{\sigma\leftarrow d} X_{jR}^{d\leftarrow \sigma} - X_{jR}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow \sigma} X_{iN}^{-\sigma\leftarrow -\sigma} \\
& + X_{jR}^{\sigma\leftarrow 0} X_{iR}^{0\leftarrow -\sigma} X_{iN}^{-\sigma\leftarrow \sigma} - \eta(\sigma) X_{jR}^{\sigma\leftarrow 0} X_{iR}^{-\sigma\leftarrow d} X_{iN}^{-\sigma\leftarrow -\sigma} \\
& - \eta(\sigma) X_{jR}^{d\leftarrow -\sigma} X_{iR}^{0\leftarrow \sigma} X_{iN}^{-\sigma\leftarrow -\sigma} + \eta(\sigma) X_{jR}^{d\leftarrow -\sigma} X_{iR}^{0\leftarrow -\sigma} X_{iN}^{-\sigma\leftarrow \sigma} \\
& - X_{jR}^{d\leftarrow -\sigma} X_{iR}^{-\sigma\leftarrow d} X_{iN}^{-\sigma\leftarrow -\sigma} + \eta(\sigma) X_{iR}^{d\leftarrow \sigma} X_{jR}^{0\leftarrow -\sigma} X_{iN}^{-\sigma\leftarrow -\sigma} \\
& - \eta(\sigma) X_{iR}^{d\leftarrow -\sigma} X_{jR}^{0\leftarrow -\sigma} X_{iN}^{-\sigma\leftarrow \sigma} - X_{iR}^{d\leftarrow \sigma} X_{jR}^{\sigma\leftarrow d} X_{iN}^{-\sigma\leftarrow -\sigma} \\
& + X_{iR}^{d\leftarrow -\sigma} X_{jR}^{\sigma\leftarrow d} X_{iN}^{-\sigma\leftarrow \sigma} + \eta(\sigma) X_{jR}^{-\sigma\leftarrow 0} X_{iR}^{\sigma\leftarrow d} X_{iN}^{-\sigma\leftarrow -\sigma} \\
& - X_{jR}^{d\leftarrow \sigma} X_{iR}^{\sigma\leftarrow d} X_{iN}^{-\sigma\leftarrow -\sigma} - \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{\sigma\leftarrow 0} \\
& - X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow d} X_{jR}^{d\leftarrow -\sigma} - X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} \\
& + \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} - X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{0\leftarrow -\sigma} \\
& + \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{-\sigma\leftarrow 0} X_{jR}^{\sigma\leftarrow d} - X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow \sigma} X_{jR}^{\sigma\leftarrow 0} \\
& - \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow \sigma} X_{jR}^{d\leftarrow -\sigma} - X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow 0} \\
& + \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{d\leftarrow \sigma} - X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{-\sigma\leftarrow 0} \\
& + \eta(\sigma) X_{iN}^{d\leftarrow d} X_{iR}^{0\leftarrow -\sigma} X_{jR}^{d\leftarrow \sigma}
\end{aligned}$$

$$[[\hat{H}_{t,cross}^{-\oplus}, \hat{H}_{t,R}], \hat{H}_{t,cross}^{-\oplus}] = 0$$

[illegible]