

$$\begin{aligned}
\hat{H}_{[3PN]} &= \frac{1}{128}(-5 + 35\nu - 70\nu^2 + 35\nu^3)p^8 \\
&+ \frac{1}{16}[(-7 + 42\nu - 53\nu^2 - 5\nu^3)p^6 + (2 - 3\nu)\nu^2 p_r^2 p^4 \\
&+ 3(1 - \nu)\nu^2 p_r^4 p^2 - 5\nu^3 p_r^6] \frac{1}{q} \\
&+ \left[\frac{1}{16}(-27 + 136\nu + 109\nu^2)p^4 + \frac{1}{16}(17 + 30\nu)\nu p_r^2 p^2 \right. \\
&+ \left. \frac{1}{12}(5 + 43\nu)\nu p_r^4 \right] \frac{1}{q^2} \\
&+ \left[\left(-\frac{25}{8} + \left(\frac{1}{64}\pi^2 - \frac{335}{48} \right) \nu - \frac{23}{8}\nu^2 \right) p^2 \right. \\
&+ \left. \left(-\frac{85}{16} - \frac{3}{64}\pi^2 - \frac{7}{4}\nu \right) \nu p_r^2 \right] \frac{1}{q^3} + \left[\frac{1}{8} + \left(\frac{109}{12} - \frac{21}{32}\pi^2 \right) \nu \right] \frac{1}{q^4}
\end{aligned}$$