H_{ehf}:

$$\begin{aligned}\left\langle N'\Lambda SJ'F\pi\left|H_{ehf}\right|N\Lambda SJF\pi\right\rangle = {} & \frac{eQq_0}{4}(-1)^{2N'+2J+I+F+S-\Lambda}\sqrt{(2J+1)(2J'+1)(2N+1)(2N'+1)} \\ & \times\begin{pmatrix} N' & 2 & N \\ -\Lambda & 0 & \Lambda \end{pmatrix}\begin{Bmatrix} J' & I & F \\ I & J & 2 \end{Bmatrix}\begin{Bmatrix} N' & J' & S \\ J & N & 2 \end{Bmatrix}\prod_{k=0}^{4}\sqrt{2I+k-1} \\ & + \frac{eQq_2}{4\sqrt{6}}\pi(-1)^{2N'+2J+I+N+F+S-\Lambda}\sqrt{(2J+1)(2J'+1)(2N+1)(2N'+1)} \\ & \times\begin{pmatrix} N' & 2 & N \\ -\Lambda & 2 & -\Lambda \end{pmatrix}\begin{Bmatrix} J' & I & F \\ I & J & 2 \end{Bmatrix}\begin{Bmatrix} N' & J' & S \\ J & N & 2 \end{Bmatrix}\prod_{k=0}^{4}\sqrt{2I+k-1}\end{aligned}$$

These elements for eQq_2 only apply for Π states.