

$$[\eta, H] = \sum_{ijkq} H_{iq}^{(2)} H_{kj}^{(2)} V_{qk}^{(2)} + H_{ik}^{(2)} H_{qj}^{(2)} V_{kq}^{(2)} - H_{kj}^{(2)} H_{qj}^{(2)} V_{iq}^{(2)} - H_{ik}^{(2)} H_{kq}^{(2)} V_{iq}^{(2)}$$

$$+ \sum_{ijkql\gamma} H_{qjk\gamma}^{(4)} V_{lq}^{(2)} H_{il}^{(2)} + H_{ljq\gamma}^{(4)} V_{kq}^{(2)} H_{il}^{(2)} + H_{qjl\gamma}^{(4)} V_{iq}^{(2)} H_{kl}^{(2)} + H_{ijq\gamma}^{(4)} V_{lq}^{(2)} H_{kl}^{(2)} \\
+ H_{iqk\gamma}^{(4)} V_{ql}^{(2)} H_{lj}^{(2)} + H_{ilkq}^{(4)} V_{q\gamma}^{(2)} H_{lj}^{(2)} + H_{ikj\gamma}^{(4)} V_{kl}^{(2)} H_{lq}^{(2)} + H_{iljk}^{(4)} V_{k\gamma}^{(2)} H_{lq}^{(2)} \\
+ H_{lj kq}^{(4)} V_{\gamma l}^{(2)} H_{i\gamma}^{(2)} + H_{ijlq}^{(4)} V_{\gamma l}^{(2)} H_{k\gamma}^{(2)} + H_{ilkq}^{(4)} V_{l\gamma}^{(2)} H_{\gamma j}^{(2)} + H_{iljk}^{(4)} V_{l\gamma}^{(2)} H_{\gamma q}^{(2)} \\
- H_{lj kq}^{(4)} V_{i\gamma}^{(2)} H_{\gamma l}^{(2)} - H_{ijlq}^{(4)} V_{k\gamma}^{(2)} H_{\gamma l}^{(2)} - H_{ilkq}^{(4)} V_{\gamma j}^{(2)} H_{l\gamma}^{(2)} - H_{iljk}^{(4)} V_{\gamma q}^{(2)} H_{l\gamma}^{(2)} \\
- H_{iqk\gamma}^{(4)} V_{qj}^{(2)} H_{kl}^{(2)} - H_{ijlq}^{(4)} V_{q\gamma}^{(2)} H_{kl}^{(2)} - H_{lqk\gamma}^{(4)} V_{qj}^{(2)} H_{il}^{(2)} - H_{lj kq}^{(4)} V_{q\gamma}^{(2)} H_{il}^{(2)} \\
- H_{qlk\gamma}^{(4)} V_{iq}^{(2)} H_{lj}^{(2)} - H_{ilq\gamma}^{(4)} V_{kq}^{(2)} H_{lj}^{(2)} - H_{klj\gamma}^{(4)} V_{ik}^{(2)} H_{lq}^{(2)} - H_{ilk\gamma}^{(4)} V_{jk}^{(2)} H_{lq}^{(2)} \\
- V_{qjk\gamma}^{(4)} H_{lq}^{(2)} H_{il}^{(2)} - V_{lj q\gamma}^{(4)} H_{kq}^{(2)} H_{il}^{(2)} + V_{lqk\gamma}^{(4)} H_{qj}^{(2)} H_{il}^{(2)} + V_{lqjk}^{(4)} H_{q\gamma}^{(2)} H_{il}^{(2)} \\
- V_{qjl\gamma}^{(4)} H_{iq}^{(2)} H_{kl}^{(2)} - V_{ijq\gamma}^{(4)} H_{lq}^{(2)} H_{kl}^{(2)} + V_{iq l\gamma}^{(4)} H_{qj}^{(2)} H_{kl}^{(2)} + V_{iqjl}^{(4)} H_{q\gamma}^{(2)} H_{kl}^{(2)} \\
+ V_{qlk\gamma}^{(4)} H_{iq}^{(2)} H_{lj}^{(2)} + V_{ilq\gamma}^{(4)} H_{kq}^{(2)} H_{lj}^{(2)} - V_{iqk\gamma}^{(4)} H_{ql}^{(2)} H_{lj}^{(2)} - V_{iqlk}^{(4)} H_{q\gamma}^{(2)} H_{lj}^{(2)} \\
+ V_{klj\gamma}^{(4)} H_{ik}^{(2)} H_{lq}^{(2)} + V_{ilk\gamma}^{(4)} H_{jk}^{(2)} H_{lq}^{(2)} - V_{ikj\gamma}^{(4)} H_{kl}^{(2)} H_{lq}^{(2)} - V_{iklj}^{(4)} H_{k\gamma}^{(2)} H_{lq}^{(2)}$$