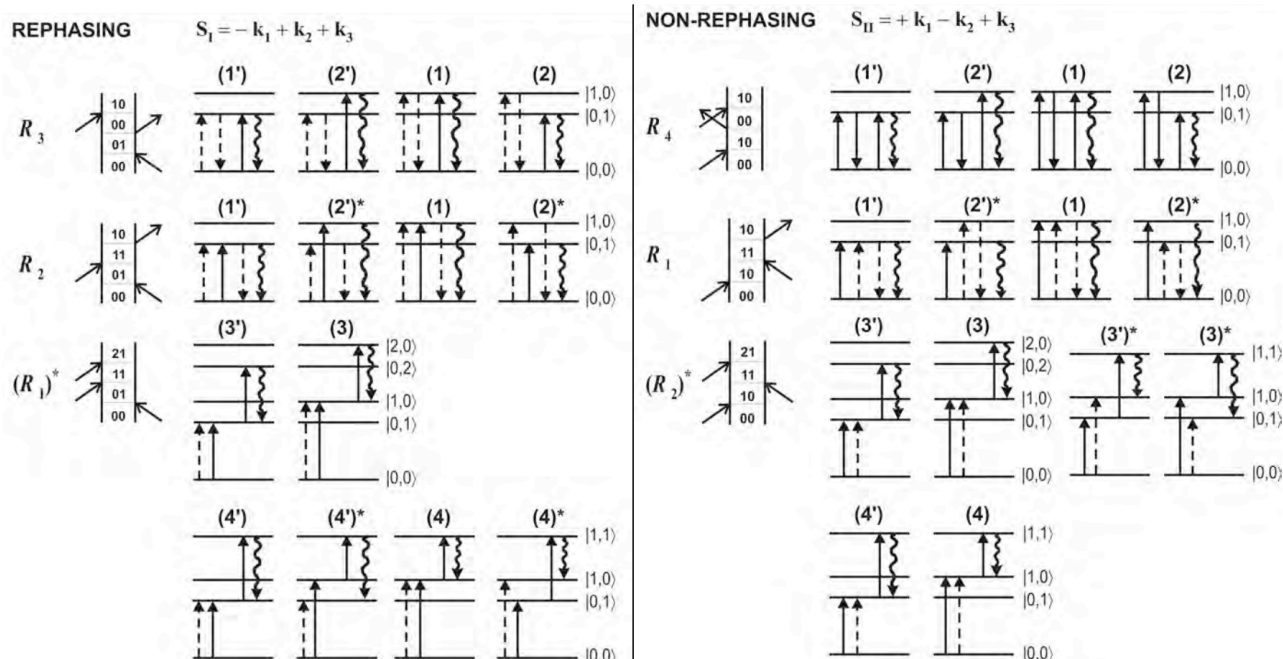


5.6: Appendix- Third Order Diagrams Corresponding to Peaks in a 2D Spectrum of Coupled Vibrations



*Diagrams that do not contribute to double-resonance experiments, but do contribute to Fourier-transform measurements. Rephasing diagrams correspond to the terms in eq. (9.14).

Using a phenomenological propagator, the S_{II} non-rephasing diagrams lead to the following expressions for the eight peaks in the 2D spectrum.

$$\begin{aligned}
 S_{II}(\omega_1, \omega_3) = & \frac{2|\mu_{s,0}|^4 + |\mu_{a,0}|^2|\mu_{s,0}|^2}{[-i(\omega_1 + \omega_{s,0}) + \Gamma_{s,0}][i(\omega_3 - \omega_{s,0}) + \Gamma_{s,0}]} + \frac{2|\mu_{a,0}|^4 + |\mu_{a,0}|^2|\mu_{s,0}|^2}{[-i(\omega_1 + \omega_{a,0}) + \Gamma_{a,0}][i(\omega_3 - \omega_{a,0}) + \Gamma_{a,0}]} \\
 & + \frac{|\mu_{a,0}|^2|\mu_{s,0}|^2}{[-i(\omega_1 + \omega_{s,0}) + \Gamma_{s,0}][i(\omega_3 - \omega_{a,0}) + \Gamma_{a,0}]} + \frac{|\mu_{a,0}|^2|\mu_{s,0}|^2}{[-i(\omega_1 + \omega_{a,0}) + \Gamma_{a,0}][i(\omega_3 - \omega_{s,0}) + \Gamma_{s,0}]} \\
 & - \frac{|\mu_{s,0}|^2|\mu_{2s,s}|^2 + \mu_{s,0}\mu_{0,a}\mu_{as,s}\mu_{a,as}}{[-i(\omega_1 + \omega_{s,0}) + \Gamma_{s,0}][i(\omega_3 - \omega_{s,0} + \Delta_s) + \Gamma_{2s,s}]} - \frac{|\mu_{a,0}|^2|\mu_{2a,a}|^2 + \mu_{a,0}\mu_{0,s}\mu_{as,a}\mu_{s,as}}{[-i(\omega_1 + \omega_{a,0}) + \Gamma_{a,0}][i(\omega_3 - \omega_{a,0} + \Delta_a) + \Gamma_{2a,a}]} \\
 & - \frac{|\mu_{s,0}|^2|\mu_{as,s}|^2}{[-i(\omega_1 + \omega_{s,0}) + \Gamma_{s,0}][i(\omega_3 - \omega_{a,0} + \Delta_{as}) + \Gamma_{as,s}]} - \frac{|\mu_{a,0}|^2|\mu_{as,a}|^2}{[-i(\omega_1 + \omega_{a,0}) + \Gamma_{a,0}][i(\omega_3 - \omega_{s,0} + \Delta_{as}) + \Gamma_{as,a}]} \\
 \equiv & \mathbf{1 + 1' + 2 + 2' + 3 + 3' + 4 + 4'}
 \end{aligned}$$

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