uct $q_{x\,i}^- \times q_{\beta\,j}^+$. In this approach as $q_{x\,i}$ contribute to our effects. $q_{i\,i}$ is an eigenfunction of H_e . applex and is the *i*-th basis functing $H_{e\,1}$ as a perturbation and ain a mixing between even and

$$\frac{|\dot{r}_{\mu}i\rangle}{i} \psi_{\nu j}^{-}$$
 (4)

energies $E_{\mu j}(q_{x\,i})$ are now funcave functions $\chi_k^{\mu j}(q_{x\,i})$ are eigenet of nuclear quantum numbers. of $\psi'_{\mu j}$ and $\chi_k^{\mu j}$ [10]:

(5)

transition between the ground

$$\sum_{i=1}^{z} r_{i} \left| \psi_{\mu}' \right|^{2}. \tag{6}$$

_{)μ} the mean energy of the tranthermal average over the ground

n (3a) of H_{el} into account. We of products of the form $q_{\lambda i} q_{\beta j}$ ns of the lattice cell, each ionic and a dynamic part $Q_{\lambda i}$:

rdinates q_{xi} of the complex we

$$\langle Q_{\beta j} + Q_{\alpha i 0} Q_{\beta j 0} \rangle =$$

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$$\langle Q_{\beta j 0} + Q_{\alpha i 0} Q_{\beta j 0} \rangle =$$

$$\langle Q_{\beta j 0} + Q_{\alpha i 0} Q_{\beta j 0} \rangle =$$

e the coordinates of the potential uding the linear electron-lattice Jahn-Teller distortions, we only rity which do not contribute to on only distortions of odd parity nsition. The octahedral complex ry and one threefold degenerate onance modes were observed in from Γ_5^- -modes and assume that parity breaking effect. \mathcal{Q}_{40}^- = ortion of the defect. We take the in the lattice cell:

$$_{0}Q_{4j0}^{-}=$$

$$Q_{4j0}^2 \, \delta_{ij} = \frac{1}{3} \, Q_0^2 \, \delta_{ij} \,. \tag{9}$$

N is the number of possible off-centre positions. Q_0 may be called the off-centre displacement, but note that it does not necessarily describe a static displacement of the defect ion.

Inserting (5), (7), and (8) into (6) we obtain for the oscillator strength

$$f_{T_{1}^{+} \to T_{4}^{+}(\Gamma_{5}^{+})} = A_{4(5)}^{2} \left\{ \eta_{x}^{2} \left(\left\langle Q_{4y}^{2} \right\rangle + \left\langle Q_{4z}^{2} \right\rangle \right) + \text{cyclic terms} \right\} + A_{4(5)}^{2} \left\{ \eta_{x}^{2} \left(\left\langle Q_{4y}^{2} \right\rangle + \left\langle Q_{4z}^{2} \right\rangle \right) + \text{cyclic terms} \right\},$$
 (10)

$$f_{I_1^+ \to I_3^+} = A_3^2 \left\{ \eta_x^2 \langle Q_{4x}^2 \rangle + \text{cyclic terms} \right\} + A_3^2 \left\{ \eta_x^2 Q_{4x0}^2 + \text{cyclic terms} \right\}.$$
 (11)

 A_3 , A_4 , and A_5 are constants, depending on the excited state of the transition. $\eta = (\eta_x, \eta_y, \eta_z)$ is the unit vector of polarization. The first expression describes transitions from a nondegenerated state Γ_1^+ to the orbital triplet states Γ_4^+ , Γ_5^+ , the second one transitions to an orbital doublet state Γ_3^+ . The second term represents the effect of the off-centre potential. Without stress the expressions (10) and (11) are isotropic in the polarization, because the mean square amplitudes of the lattice vibrations are equal in each direction:

$$\langle Q_{4i}^2 \rangle = \langle Q^2 \rangle = \frac{\hbar}{2 \omega} \coth \frac{\hbar \omega}{2 kT} \approx \begin{cases} \frac{kT}{\omega^2} & \text{for } kT \gg \hbar \omega , \\ \frac{\hbar}{2 \omega} & \text{for } kT \ll \hbar \omega . \end{cases}$$
 (12)

Inserting (12) into (10) and (11) we obtain the temperature dependence of the oscillator strength [2].

Uniaxial stress lifts the degeneracy of the resonance mode and we get different vibrational frequencies and different off-centre distortions parallel and perpendicular to the stress axis. As an example Fig. 4 shows the splitting of

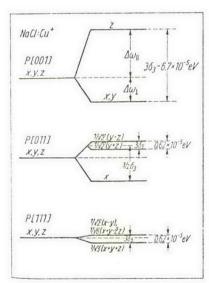


Fig. 4. Stress splitting of the local mode at 23.5 cm $^{-1}$ in NaCl:Cu $^{\circ}$ at 4.3 $^{\circ}$ K. The applied stress is 100 kp/cm 2

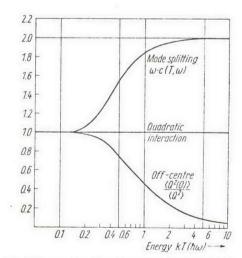


Fig. 5. Temperature dependence of the different effects contributing to $\binom{f_{||}-f_{\perp}}{f}$