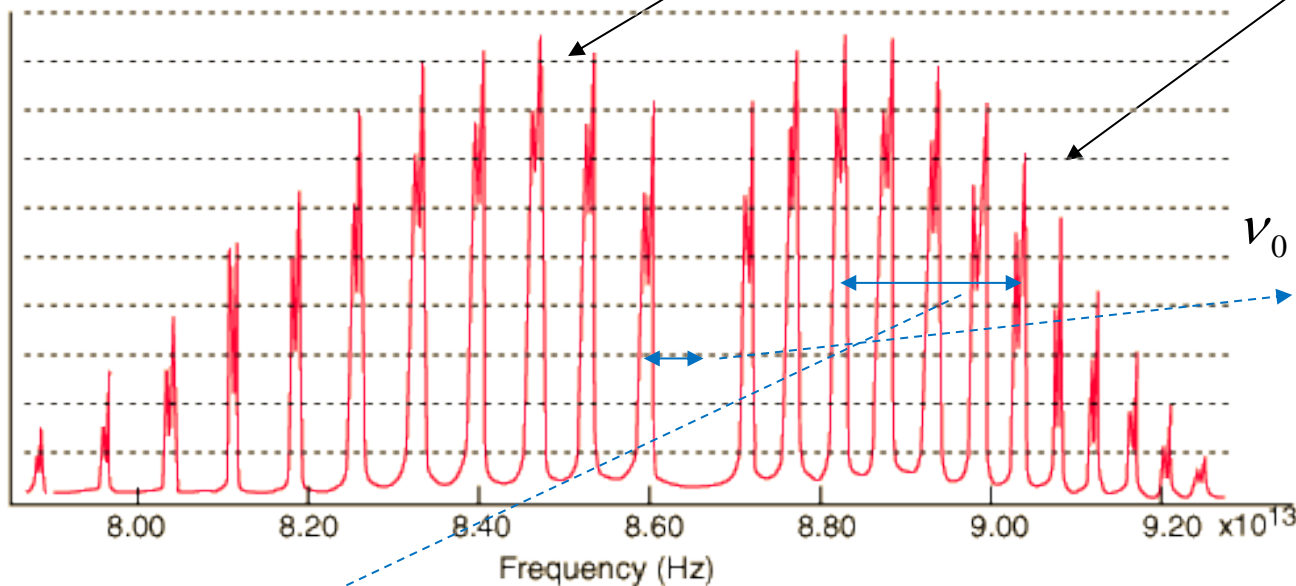


# Rotacijska stanja HCl

<http://hyperphysics.phy-astr.gsu.edu/hbase/molecule/imgmol/hclspec.gif>



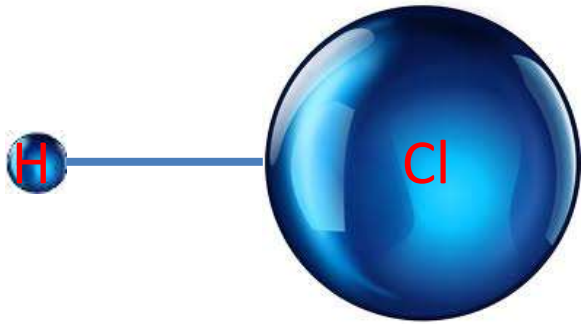
$$\omega = \omega_0 - \frac{\hbar}{\mathcal{J}} \ell \quad \text{veja R}$$

$$\omega = \omega_0 + \frac{\hbar}{\mathcal{J}} (\ell + 1) \quad \text{veja P}$$

$$\nu_0 = \nu + \frac{\hbar}{2\pi \mathcal{J}} \approx 8,65 \cdot 10^{13} \text{ s}^{-1}$$

$$\Delta\omega = 2\pi\Delta\nu \approx 1,26 \cdot 10^{13} \text{ s}^{-1}$$

$$\Delta\omega = 4 \frac{\hbar}{\mathcal{J}} \Rightarrow \mathcal{J} = 4 \frac{\hbar c}{\Delta\omega c} = 4 \frac{197 \text{ MeV} \cdot \text{fms}}{1,26 \cdot 10^{13} \text{ s}^{-1} \cdot 3 \cdot 10^8 \text{ m}} = 1,2 \cdot 10^{-28} \text{ eVs}^2 = 3,3 \cdot 10^{-47} \text{ kgm}^2$$



$$\begin{aligned}
 \mathcal{J} &= m_r R^2 = \frac{m_p (17m_p + 18m_n)}{18m_p + 18m_n} R^2 \approx \\
 &\approx \frac{35m_p^2}{36m_p} R^2 \approx m_p c^2 \frac{R^2}{c^2} = \\
 &= 930 \text{ MeV} \frac{(0,127 \text{ nm})^2}{(3 \cdot 10^8 \text{ m/s})^2} = 1,7 \cdot 10^{-28} \text{ eVs}^2 = \\
 &= 2,7 \cdot 10^{-47} \text{ kgm}^2
 \end{aligned}$$

$$\nu_0 \approx 8,65 \cdot 10^{13} \text{ s}^{-1} \Rightarrow \lambda_0 \approx 3,5 \mu\text{m}$$

mikrovalovi → klistron

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