

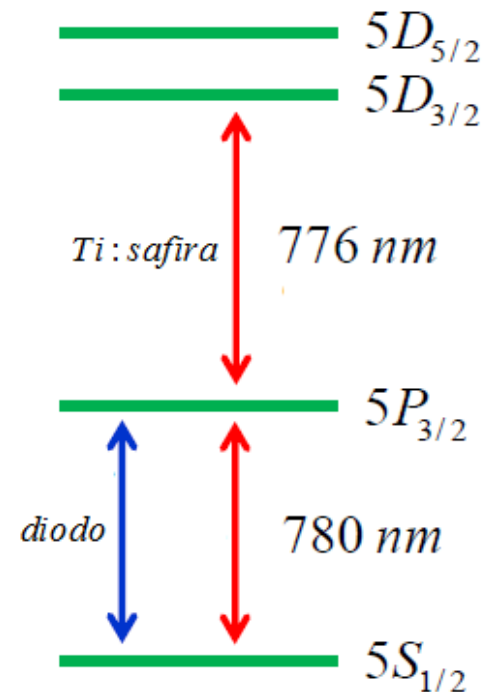
Ressonâncias de dois fótons com laser de femtossegundos e de diodo



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Introdução

Estamos interessados na transição de dois fótons em vapor de rubídio envolvendo um laser de femtossegundos e um laser de diodo.

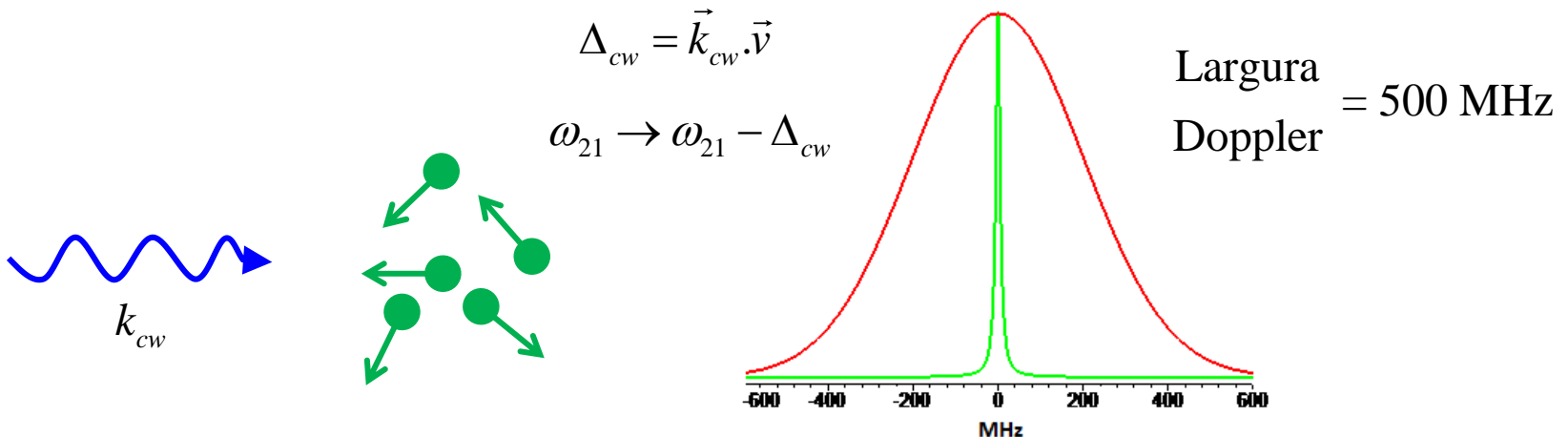


Sumário

- ∞ Laser de diodo e alargamento Doppler
- ∞ Características do laser de Ti:safira
- ∞ Experimento
- ∞ Resultados
- ∞ Modelo teórico
- ∞ Cálculo do off-set do laser de Ti:safira

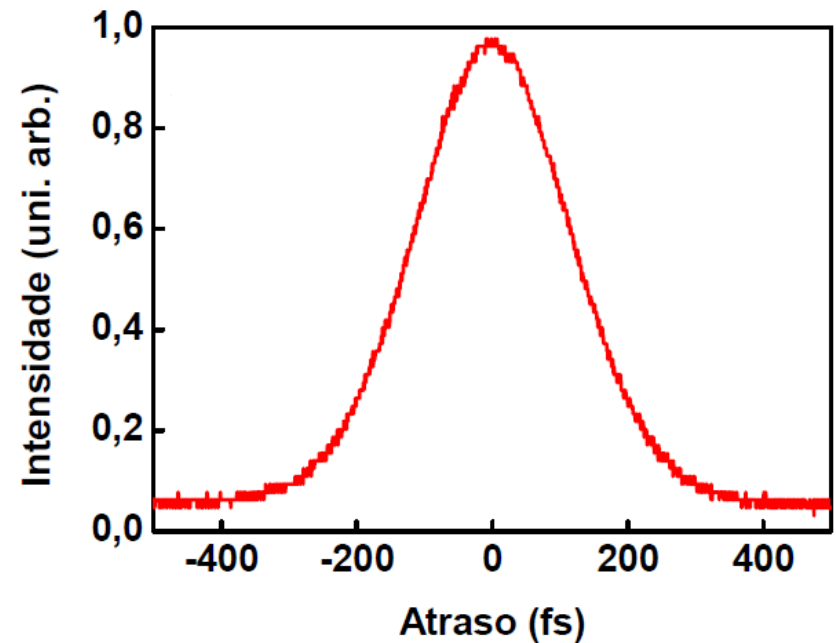
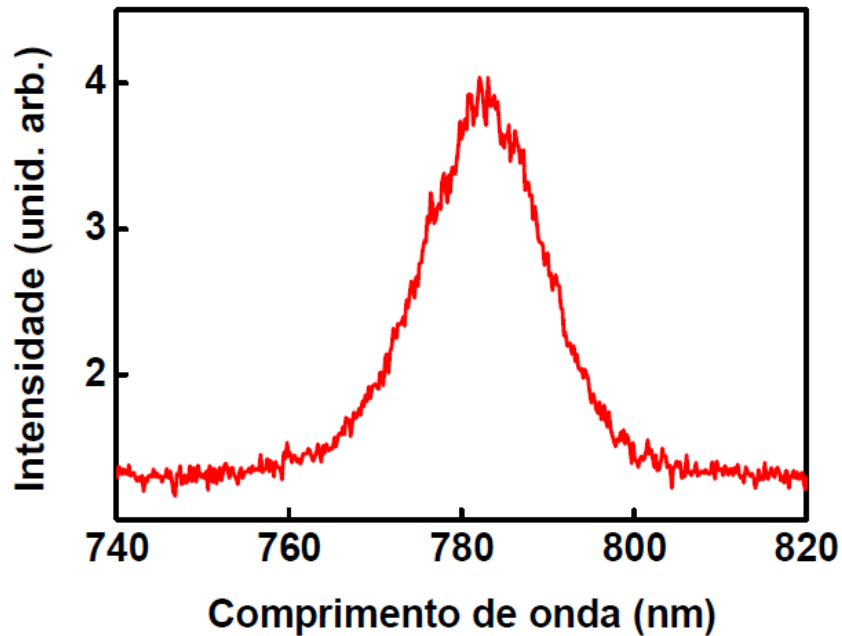
Laser de diodo e alargamento Doppler

- ∞ Laser de diodo contínuo.
- ∞ Largura de linha: < 1 MHz.
- ∞ Largura de linha da transição atômica: 6 MHz. (5S – 5P)

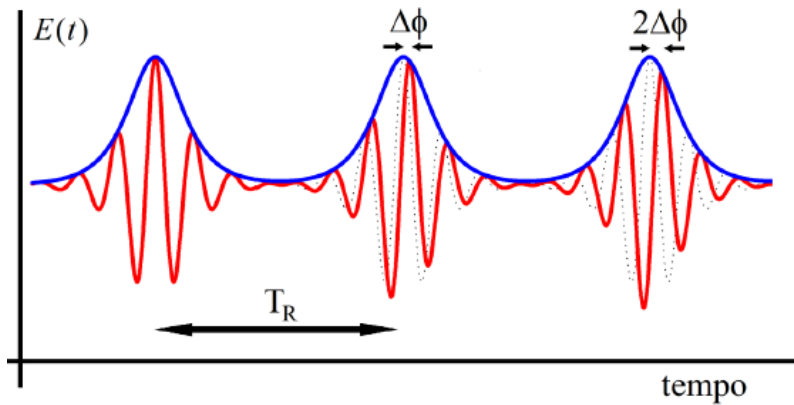


O laser de Ti:safira

Características de um pulso individual:



O laser de Ti:safira



$$T_R \sim 1 \text{ ns}$$

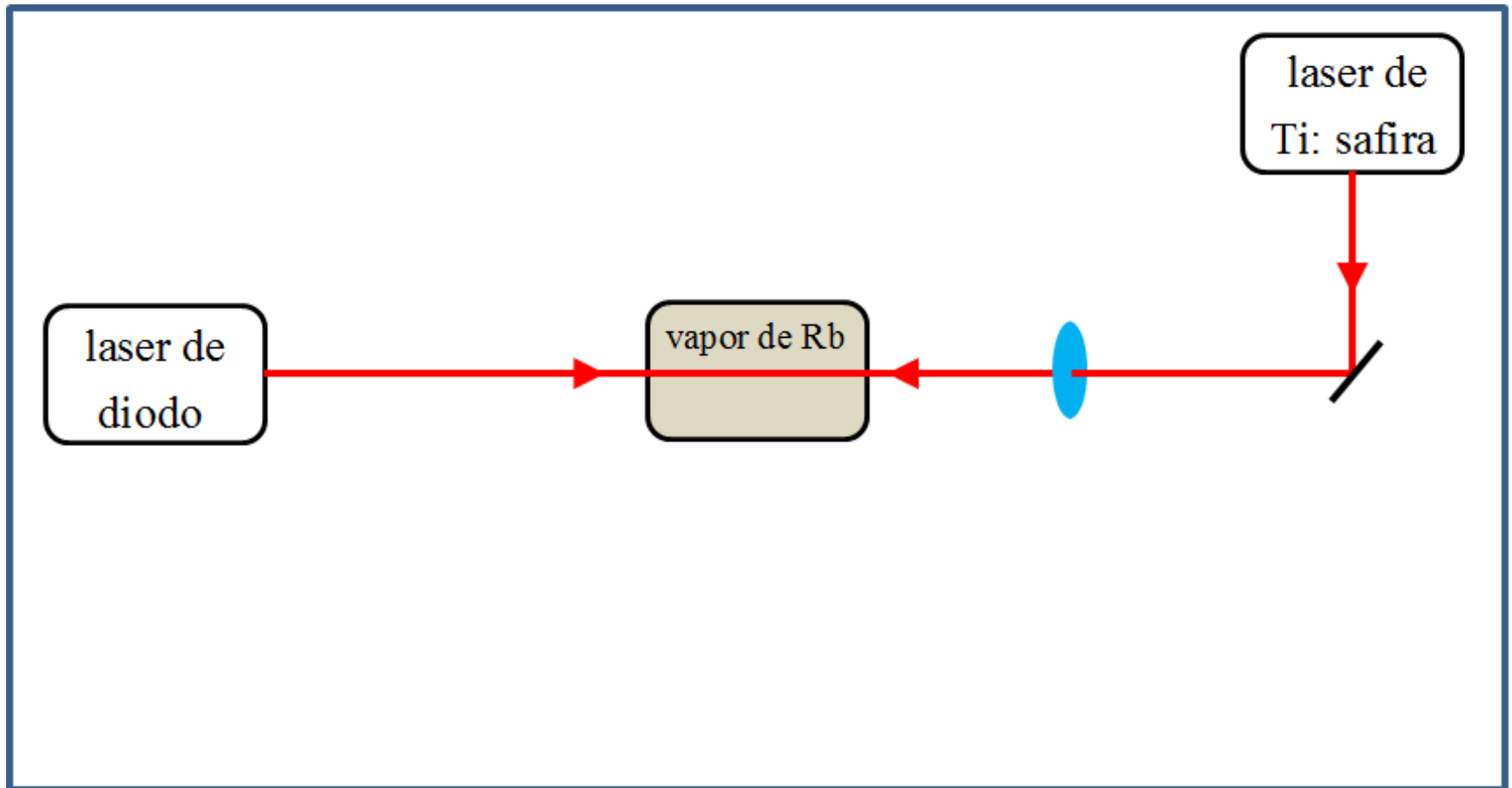
$$f_R \sim 1 \text{ GHz}$$

$$\gg \begin{cases} 6 \text{ MHz (} 5P_{3/2} \text{)} \\ 660 \text{ KHz (} 5D \text{)} \end{cases}$$

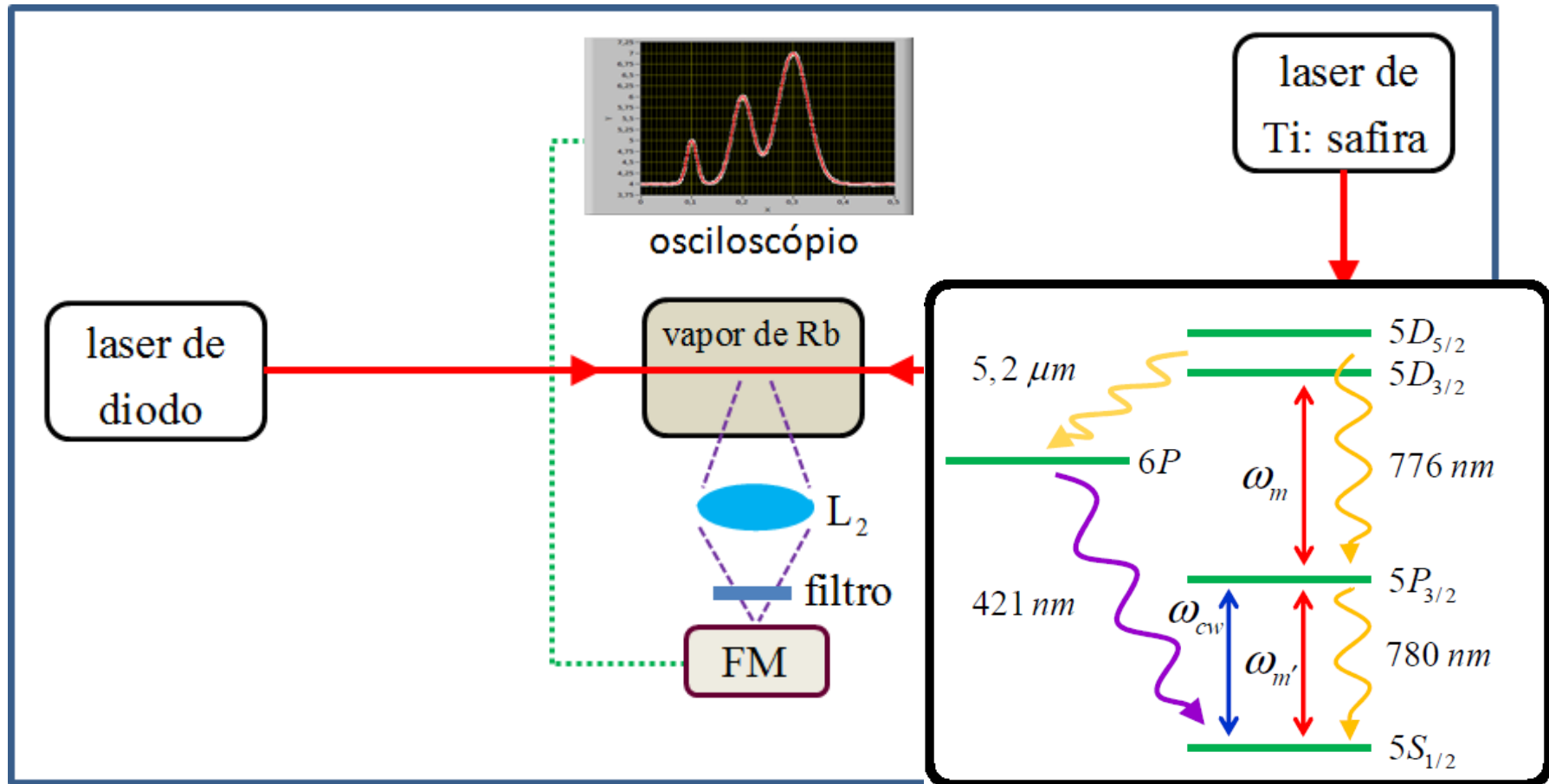
“Acumulação coerente”

(D. Felinto et al, Opt. Commun. 215, 69 (2003))

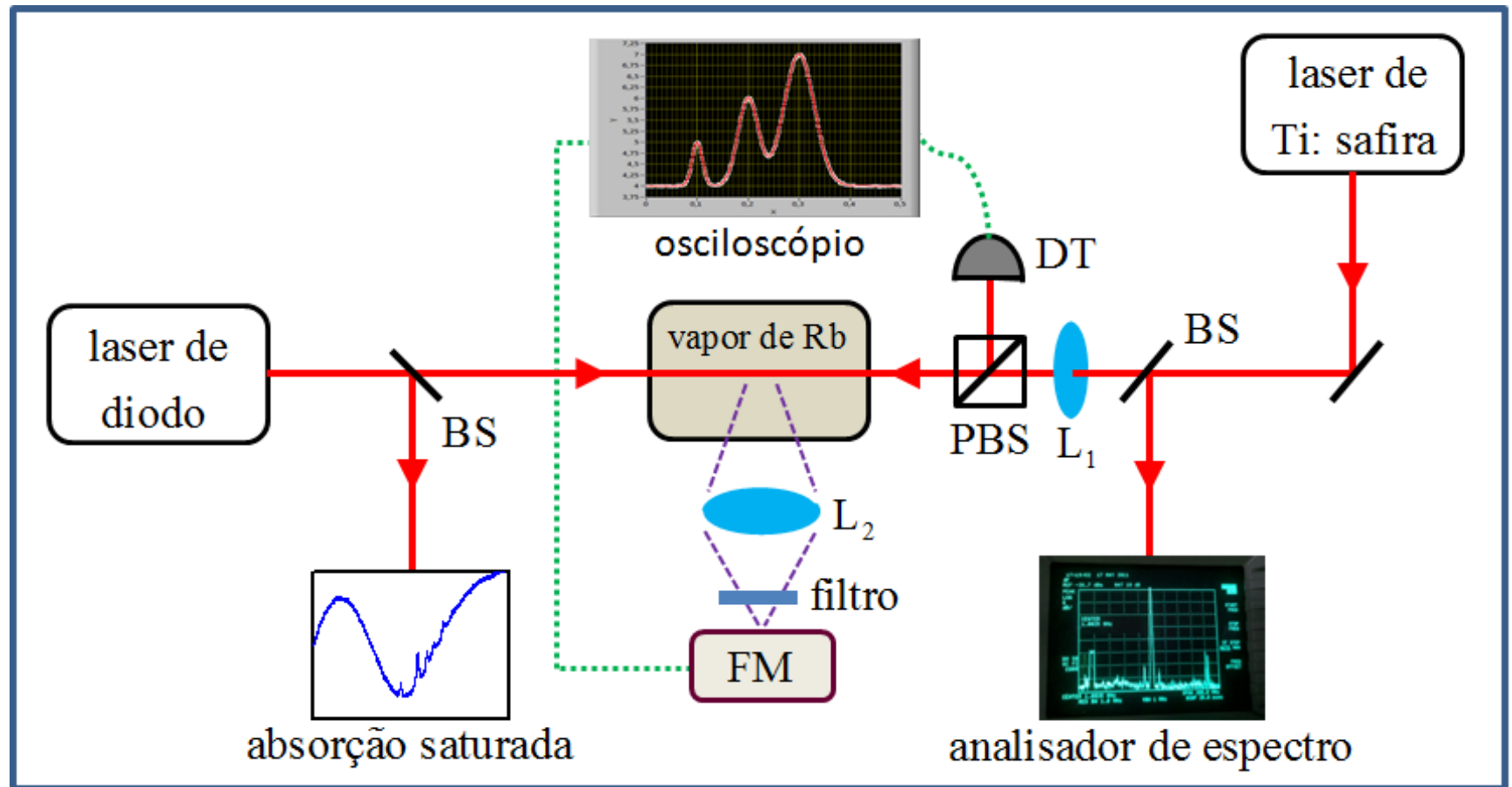
Experimento



Experimento



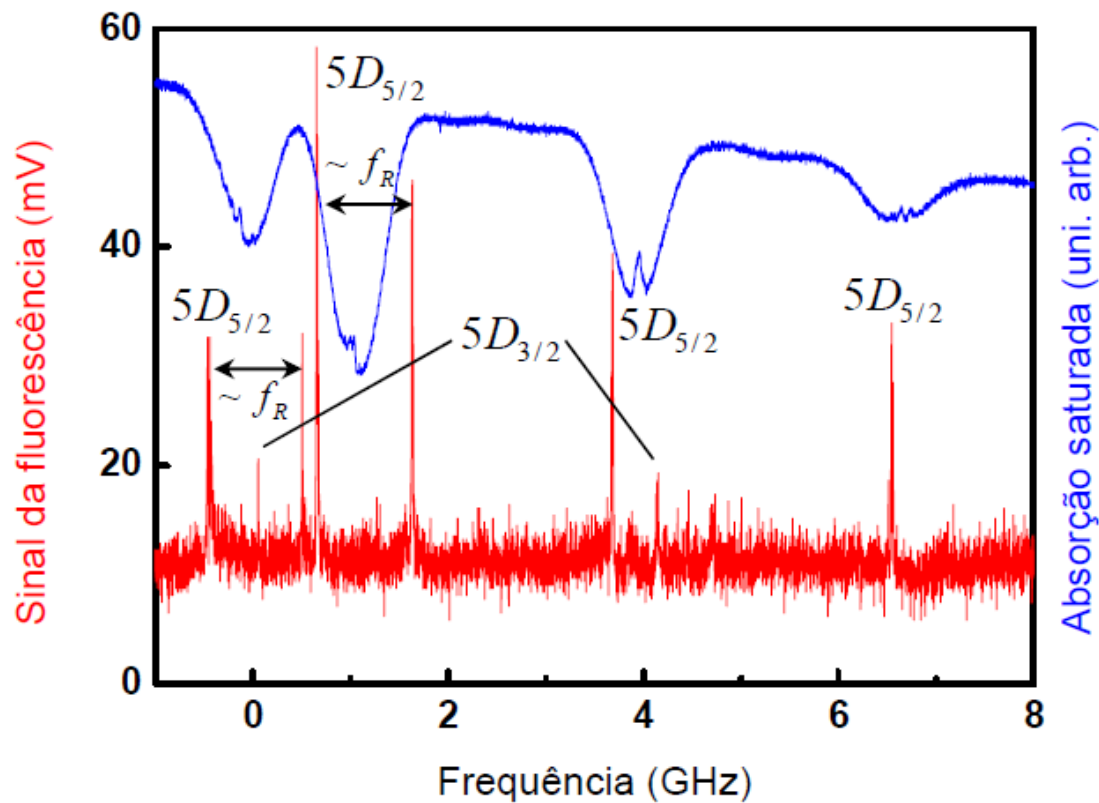
Experimento



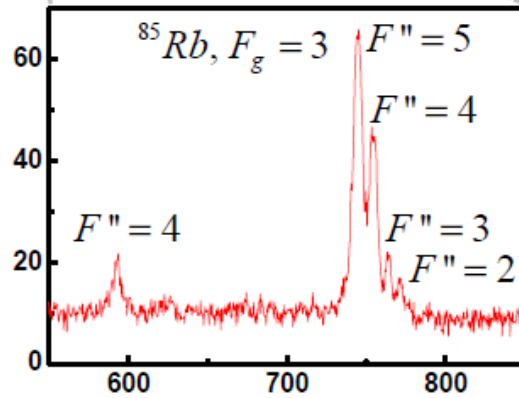
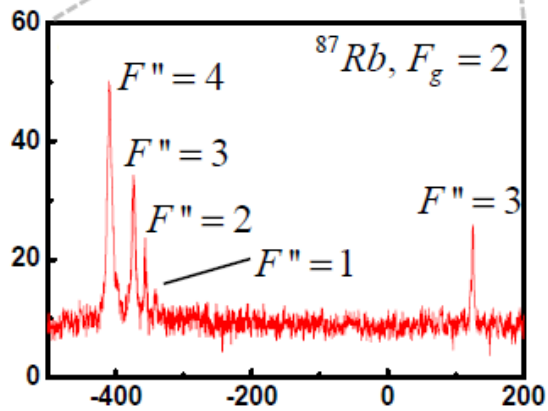
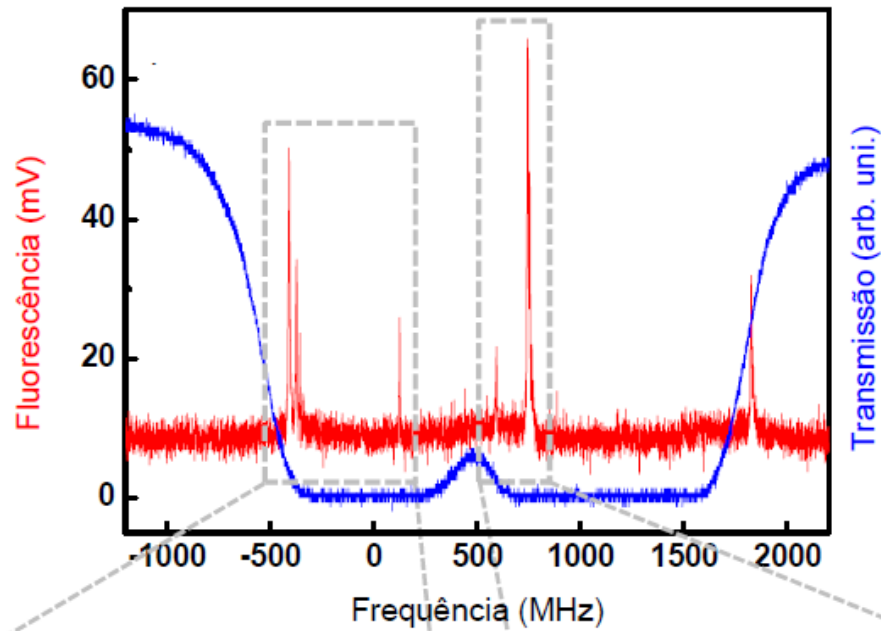
Resultados

Laser de Ti:safira travado

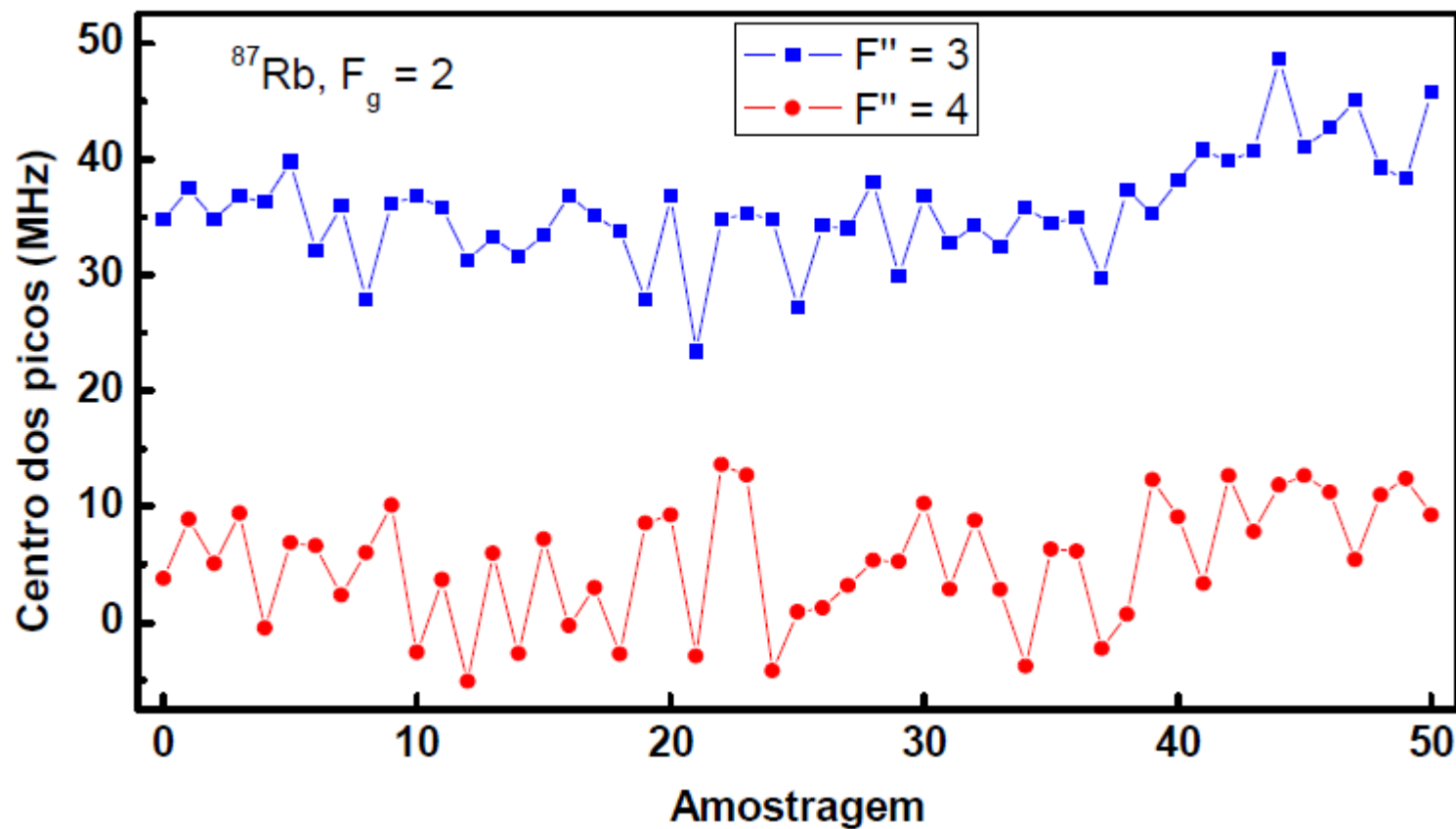
Laser de diodo varrendo



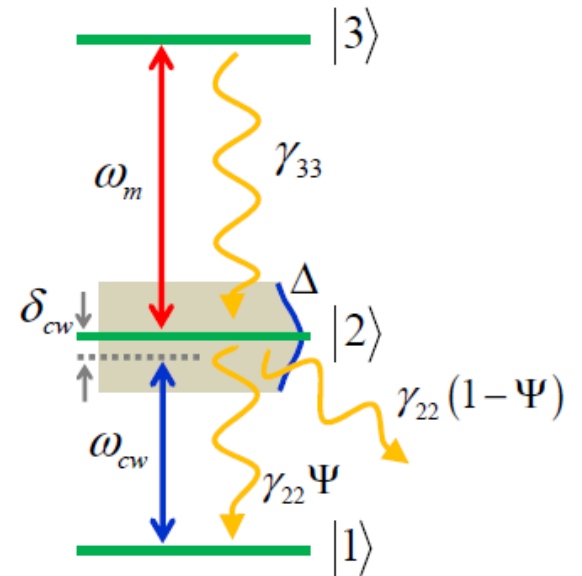
Resultados



Resultados



Modelo teórico



$$\dot{\rho}_{11} = 0 = 2\Omega_{cw} \text{Im}(\sigma_{12}) + \Psi\gamma_{22}\rho_{22} - \Gamma(\rho_{11} - \rho_{11}^{eq})$$

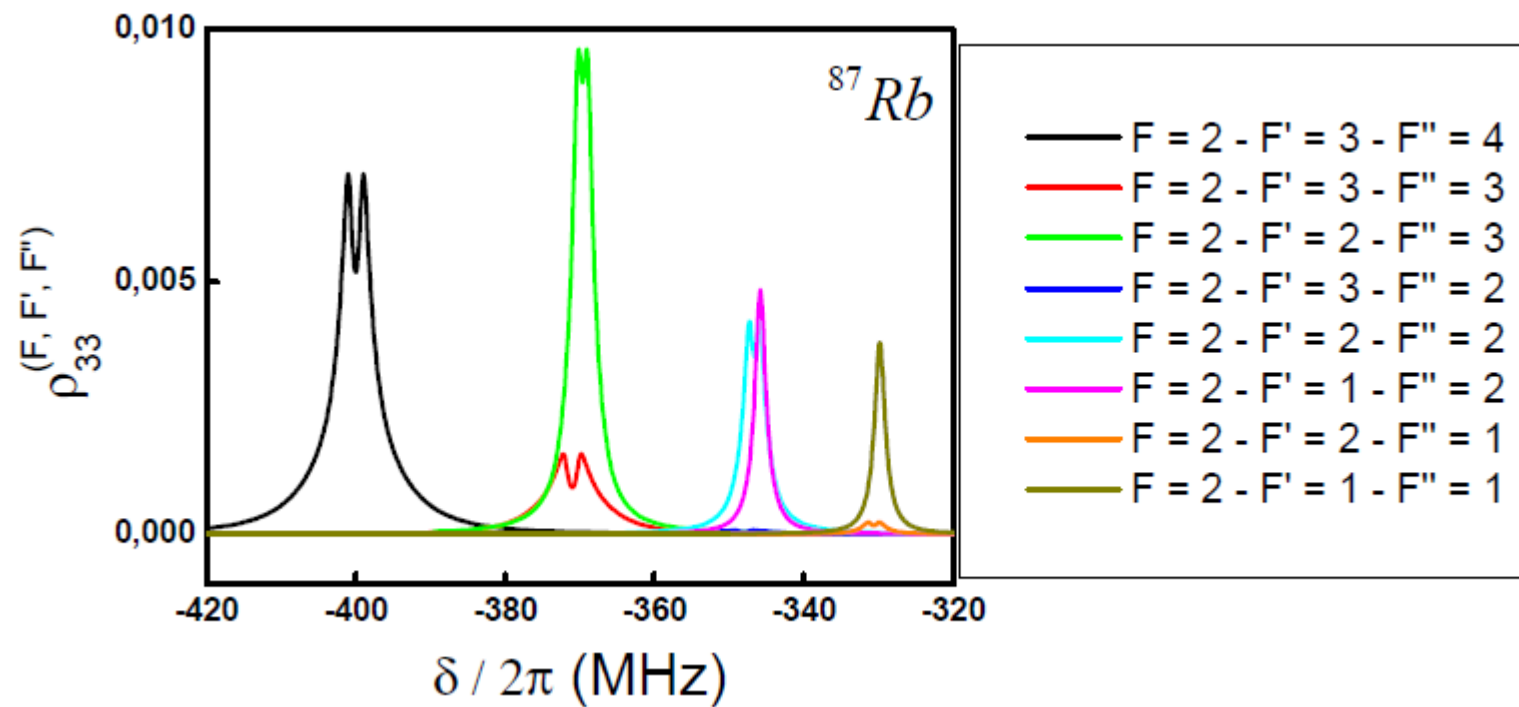
$$\dot{\rho}_{22} = 0 = -2\Omega_{cw} \text{Im}(\sigma_{12}) + 2\Omega_m \text{Im}(\sigma_{23}) - (\gamma_{22} + \Gamma)\rho_{22} + \gamma_{33}\rho_{33}$$

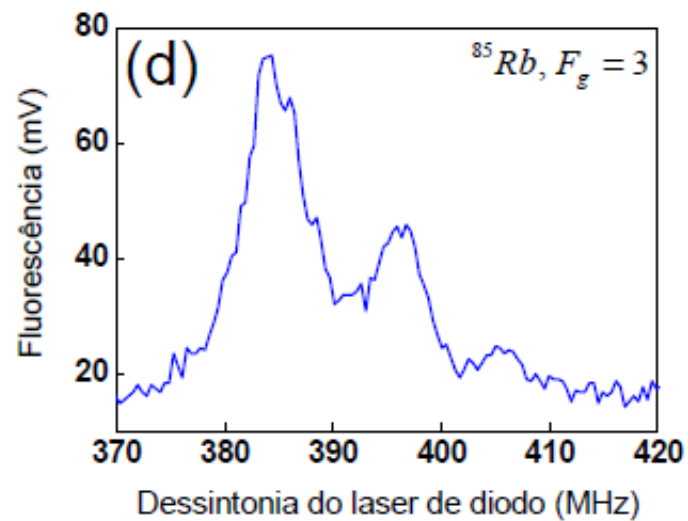
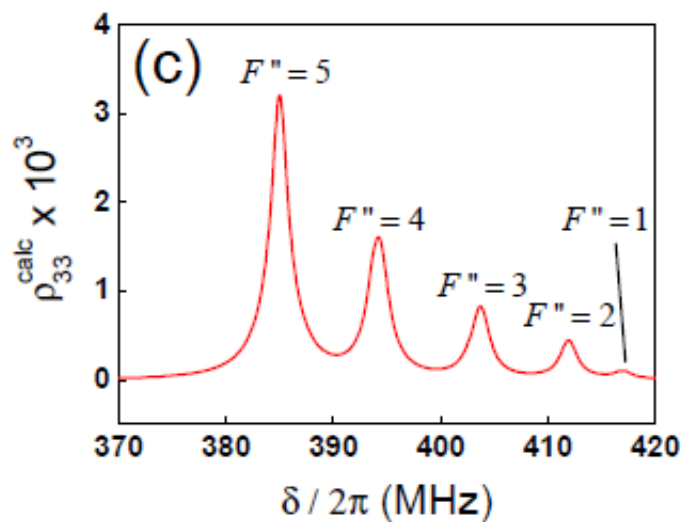
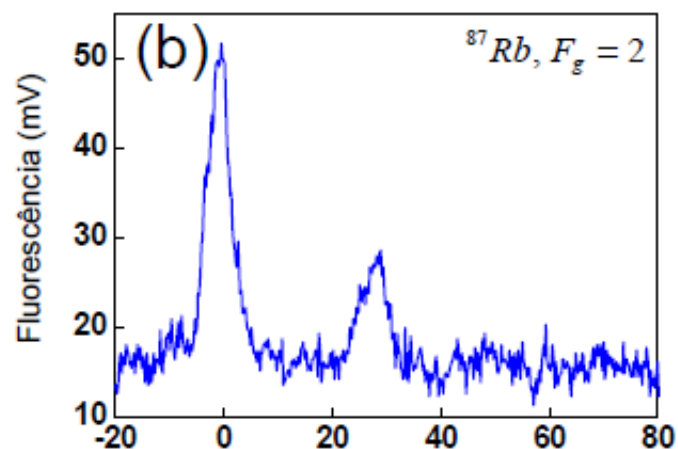
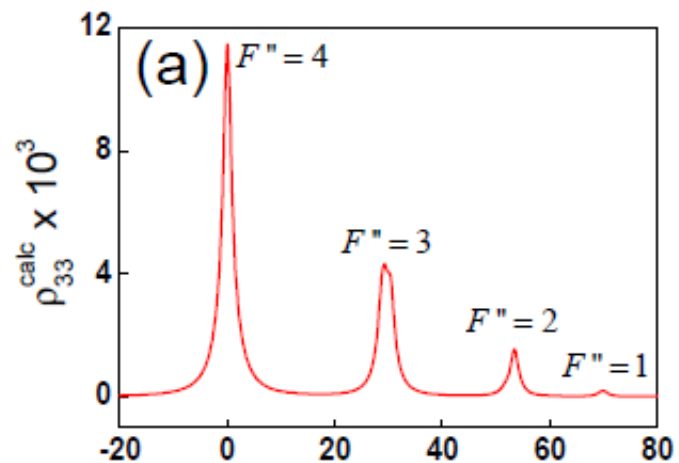
$$\dot{\rho}_{33} = 0 = -2\Omega_m \text{Im}(\sigma_{23}) - (\Psi\gamma_{33} + \Gamma)\rho_{33} + \gamma_{33}\rho_{33}$$

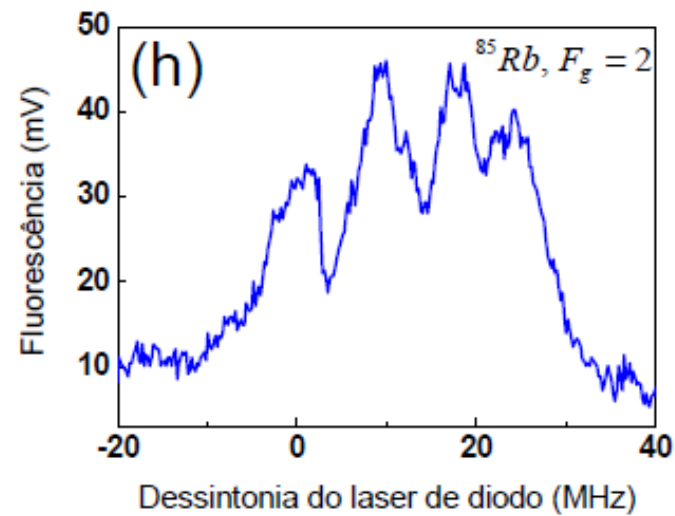
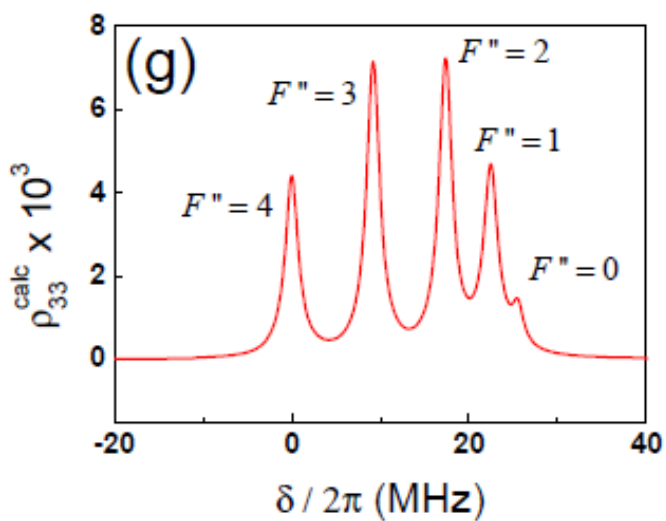
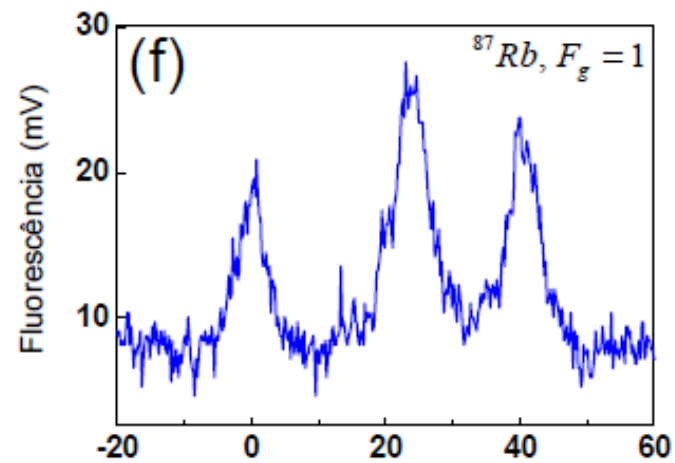
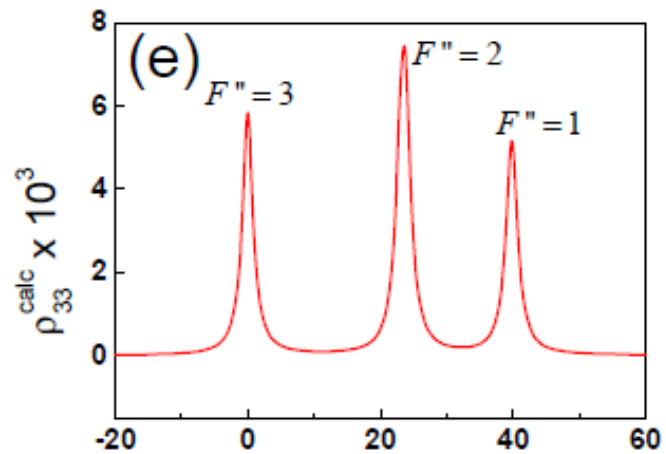
$$\dot{\sigma}_{12} = 0 = [i(\delta_{cw} - \Delta_{cw}) - \gamma_{12} - \Gamma] \sigma_{12} - i\Omega_{32}(t)\sigma_{13} + i\Omega_{cw}(\rho_{22} - \rho_{11})$$

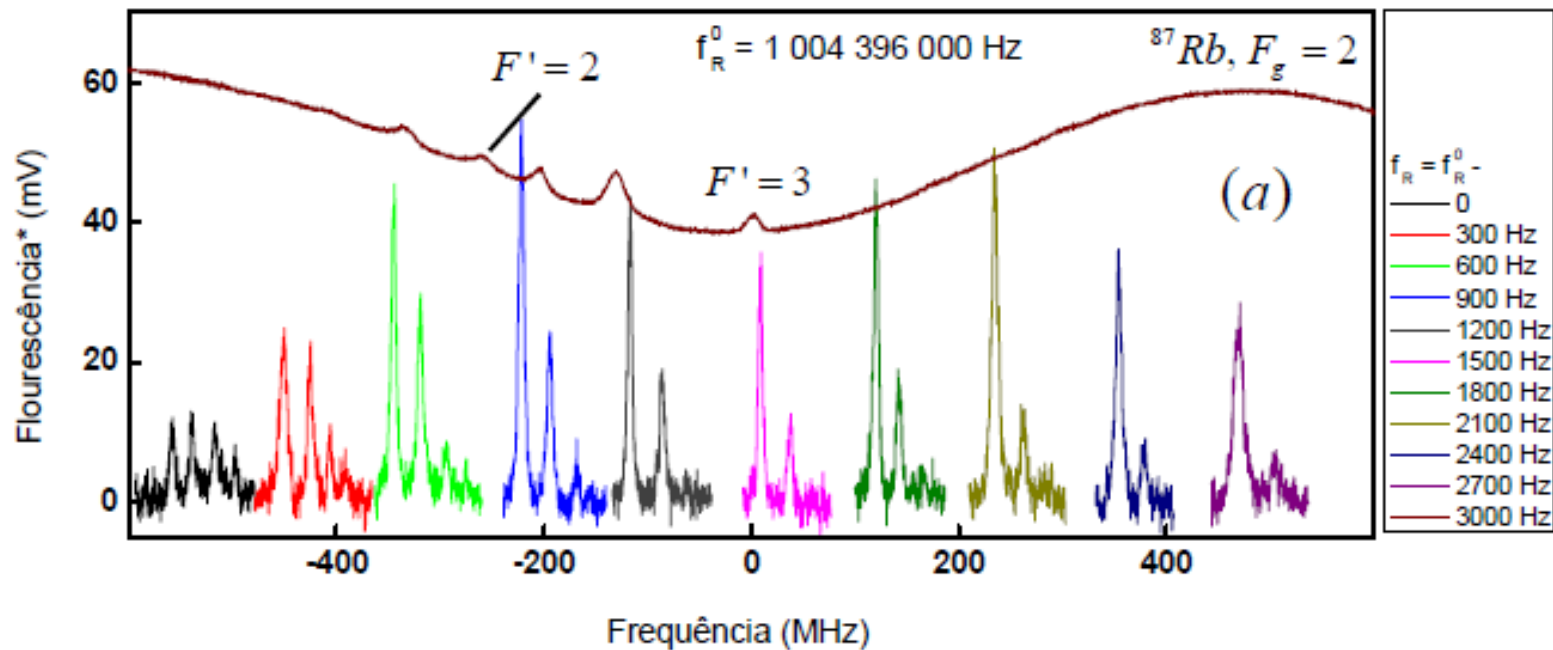
$$\dot{\sigma}_{23} = 0 = [i(\delta_m + \Delta_m) - \gamma_{23} - \Gamma] \sigma_{23} - i\Omega_{21}(t)\sigma_{13} + i\Omega_m(\rho_{33} - \rho_{22})$$

$$\dot{\sigma}_{13} = 0 = [i(\delta_{cw} + \delta_m + \Delta_{cw} - \Delta_m) - \gamma_{13} - \Gamma] \sigma_{13} + i\Omega_{cw}\sigma_{23} - i\Omega_m\sigma_{12}$$









Cálculo da frequência de off-set

Conclusões



