6.3 Struktura rotacyjna widm (cz. dwuatomowe)

$^1\Sigma - {}^1\Sigma$

$$F_v(J) = B_v J(J+1) - D_v J^2(J+1)^2 + \dots$$

$$\psi = \psi_e \psi_v \psi_r$$

$\Delta J = 0, \pm 1 \qquad J=0 \not\to J=0$

$+ \longleftrightarrow -$

$\Delta J = \pm 1 \quad s \to s \;,\; a \to a \;;\; \Delta J = 0 \quad s \leftrightarrow a$

$r_e' > r_e'' \;\to\; B' < B''$

gałąź R

$$\bar{\nu}_R = \left[T_e' + G'(v') + F'(J+1)\right] + \\ - \left[T_e'' + G''(v'') + F''(J)\right] =$$

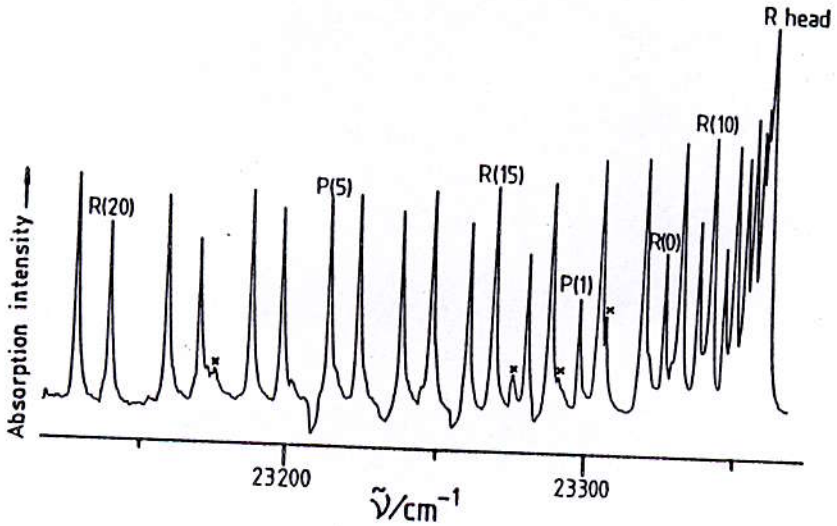
$$= \bar{\nu}^e_{v'v''} + (B' + B'')(J+1) + (B' - B'')(J+1)^2$$

$J = 0, 1, 2 \dots$

$$J_2 = \frac{B'' - 3B'}{2(B' - B'')}$$

$X\,^1\Sigma^+ \longrightarrow A\,^1\Sigma^+ \qquad CuH \qquad 428\,nm$

$r_e(X) = 1.46\,Å \;,\; r_e(A) = 1.57\,Å \qquad J_2 = 6$



The *P*- and *R*-branch structure of the $A^1\Sigma^+$–$X^1\Sigma^+$ electronic transition of CuH in absorption. Lines marked with a cross are not due to CuH

7 Wybrane metody spektroskopowe

7.1 Spektroskopia wzbudzenia fluorescencji (FE)

OH, CCl_2, CH_2, TiO, FeO, CH_3O

7.2 Spektroskopia absorpcji i jonizacji wielofotonowej

$$P \sim \sum_i \varepsilon_a^2 \frac{\langle 1|\mu|v\rangle\langle v|\mu|2\rangle}{E_2 - E_1 - hc\bar{\nu}_a}$$

$$P \sim \varepsilon_a^2 \frac{\langle 1|\mu|2\rangle\langle 2|\mu|3\rangle}{hc\,\Delta\bar{\nu}}$$

7.3 Spektroskopia fotoodrywania

OH^-, CH_2^-, SiH^-, C_2^-

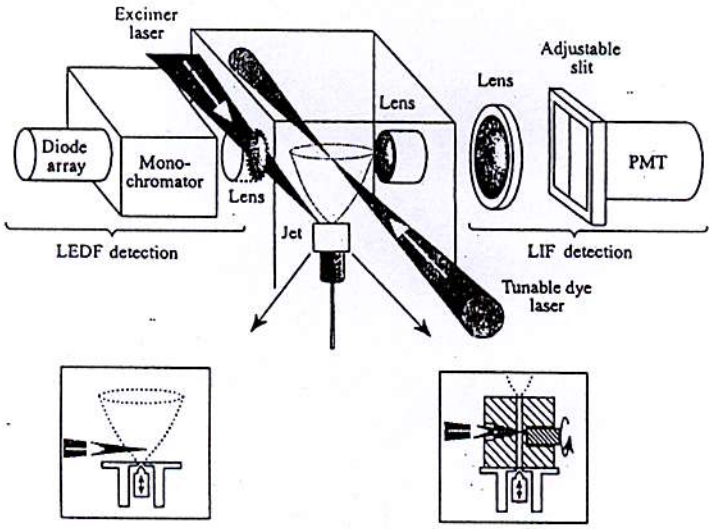
$$CH_2^-(\tilde{X}^2B_1) + h\nu \rightarrow CH_2(\tilde{a}^1A_1) + e^-$$

$$CH_2^-(\tilde{X}^2B_1) + h\nu \rightarrow CH_2(\tilde{X}^3B_1) + e^-$$

CH_2^- $(2a_1)^2(1b_2)^2(3a_1)^2(1b_1)$ $\tilde{X}^2B_1$

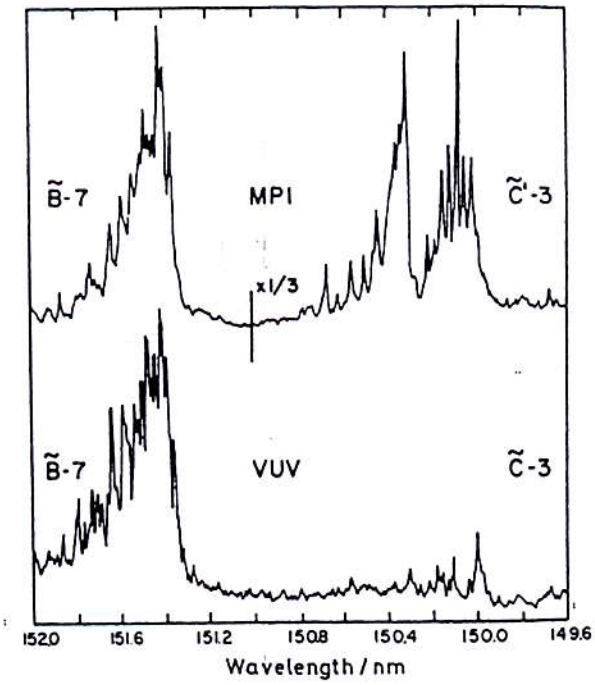
$\Downarrow$ $\Downarrow$

$\tilde{X}^3B_1$ $\tilde{a}^1A_1$

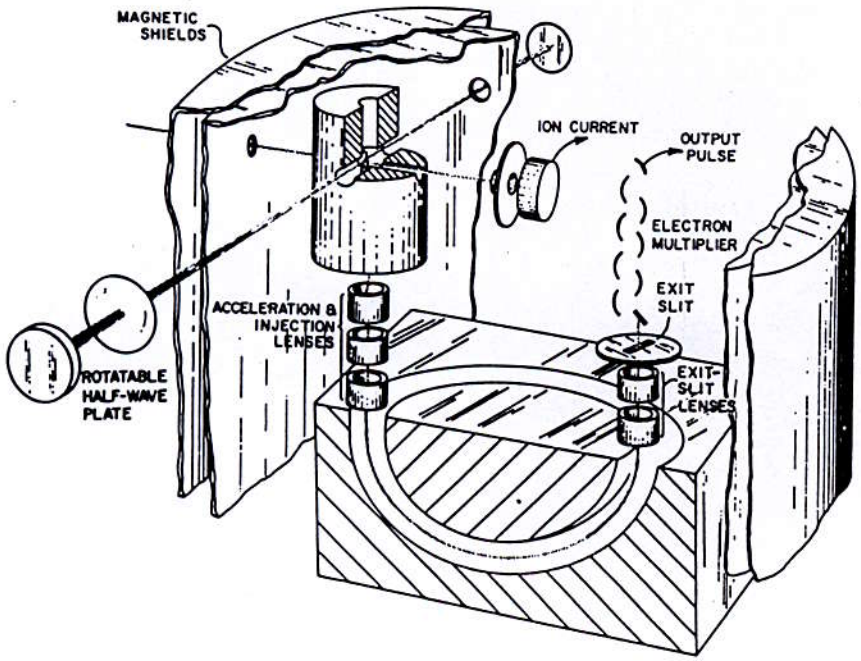


(a) Straight photolysis (b) Laser ablation and photolysis

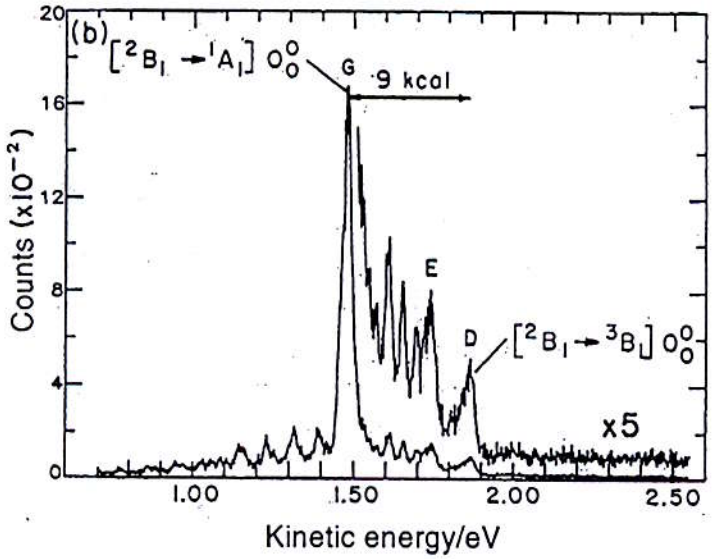
(a) Photolysis and (b) laser ablation and photolysis methods of producing jet-cooled radicals. The upper part shows how the FE (or the dispersed fluorescence) spectra of the radicals are obtained [Reproduced, with permission, from Tan, X. Q., Wright, T. G. and Miller, T. A. (1995). *Jet Spectroscopy and Molecular Dynamics*, Hollas, J. M. and Phillips, D. (Eds.), chap. 3. Blackie, Glasgow]



The upper spectrum is part of the $3+1$ REMPI spectrum of NH_3 showing the 2_0^7 band of the $\tilde{B}$–$\tilde{X}$ system and the 2_0^3 band of the $\tilde{C}'$–$\tilde{X}$ system, a band which is missing from the lower, vacuum ultraviolet one-photon absorption spectrum [Reproduced, with permission, from Nieman, G. C. and Colson, S. D. (1979). *J. Chem. Phys.*, **71**, 571]



Interaction chamber including the hemispherical electron monochromator.



Laser photoelectron spectra, obtained with 488 nm excitation, of CH_2^- produced in (a) a gas discharge ion source, resulting in vibrationally hot CH_2^-, and (b) a flowing afterglow ion source, with collisional cooling

[Reproduced, with permission, from Leopold, D. G., Murray, K. K. and Lineberger, W. C. (1984). *J. Chem. Phys.*, **81**, 1048]