

Impact of High Resolution Molecular Spectroscopy on Atmospheric Retrievals

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During the last two decades the terrestrial atmosphere has been the subject of a number of studies aiming at a precise knowledge of concentration profiles of its minor constituents. Among various techniques used to measure abundances of these constituents remote sensing optical methods are widely used. The measurements can be performed at low, medium or high resolution but in all cases a precise analysis of atmospheric spectra requires the best possible knowledge of spectral parameters (line positions, intensities, widths...) of observed species. To obtain these spectral parameters both theoretical and experimental efforts in spectroscopy are needed. After a short general introduction the talk will concentrate on specific cases (NO_2 , HNO_3 , ClNO_2 , ...) trying to exemplify the influence of quality of the spectral parameters on retrieved profiles and improvements brought by recent progress in the field of spectroscopy.

Some New Themes in the Study of Rapidly Rotating Molecules

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The present lecture is concerned with theoretical study of a strong nonlinear rotational dynamics using the method of small amplitude motion near the stationary state of a rapidly rotating polyatomic molecule. ¹

Different aspects of the method and some new phenomena will be discussed:

- Bifurcations in molecular rotational spectra. ² .
- The bifurcation in the rotational spectra of the AB₂ molecules: level clustering, broken symmetry, and the normal to local vibrational mode transition. ³ . ⁴ .
- The stabilization of the intermediate moment of inertia axis of an asymmetric top molecule by an orbiting Rydberg electron. ⁵ .
- Future perspectives.

¹ I. M. PAVLICHENKOV, *Phys. Reports* **226**, 175–279 (1993).

² I. M. PAVLICHENKOV AND B. I. ZHILINSKII, *Ann. of Phys. (NY)* **184**, 1–32 (1988).

³ B. I. ZHILINSKII AND I. M. PAVLICHENKOV, *Opt. Spectrosk. (USSR)* **64**, 413–414 (1988)

⁴ I. N. KOZIN AND I. M. PAVLICHENKOV *J. Chem. Phys.* **104**, 4105–4113 (1996).

⁵ S. S. BASOV AND I. M. PAVLICHENKOV, *Phys. Rev. Lett.* **72**, 3953–3956 (1994)