Publ. Astron. Obs. Belgrade No. 54 (1996), 49 – 54 *Contributed paper*

A DATA BASE OF AGN SPECTRAL LINES

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Abstract. The spectral lines, mainly H_β and H_α of 3C390.3, 3C120, Akn 120, III Zw 2 and Mkn 817 observed at Crimean Astrophysical Observatory by K. K. Chuvaev in the period from 1971 to 1991 are measured. The data base in the fits format is made.

1. INTRODUCTION

It is clear that the center of an Active Galactic Nucleus (AGN) contains a powerful energy source (most probably a black hole) surrounded by an accretion disk and extensive emission region. We usually divide the emission region into: a) Broad Line Region (BLR) emitting broad emission lines of neutral and singly ionzed atoms (H, He, Mg ...) and b) Narrow Line Region (NLR) emitting narrow and intesive spectral lines of highly ionzed atoms, sometimes from forbbiden transitions (O III, N III, C IV).

The shapes and changes of such spectral lines yield a wealth of information on dynamics and plasma parameters of the emitting gas regions (see e.g. Netzer 1990, Jeffery 1991).

As AGNs can not be optically resolved, modelling of their spectral lines remains the most appropriate approach to the gas dynamics in the emission regions and accretion disks.

The first motivation was to develop a kinematic model which could explain very complex spectral line shapes of AGN. A model which may explain the shape of the L_α line in Mrk 335 is presented in Popović *et al.* (1995a).

The second motivation is to experimentally continue the investigation of the influence of gravitational redshift on spectral line shapes. This influence was theoretically considered in several papers (Popović *et al.* 1994, Atanacković-Vukmanović *et al.* 1994, Popović *et al.* 1995b).

In order to investigate the complex spectral line shapes of AGN 206 spectrograms from an extensive set of Seyfert galaxies and Quasars spectra (contaning about 2000 spectra) obtained at 2.6 m telescope of Crimean Astrophysical Observatory by Dr. K. K. Chuvaev during the period 1971-1991 were selected and scaned at the Astronomical Institute of Muenster.

First we measured all of observed spectrograms of the spectra of 3C390.3, 3C120, Akn 120, III Zw 2 and Mkn 817. Here we present Tables with dates and line(s) of these spectrograms. Also, some of spectrograms of 3C 273, Akn 564, Mrk 3, Mrk 6,

Mrk 9, Mrk 10, Mrk 79, Mrk 509, NGC 1275, MGC 3227, NGC 3516, NGC 4145, NGC 5548, NGC 6677, NGC 7469, were measured.

2. TABLES OF MEASURED SPECTROGRAMS

The spectrograms were scanned at the Astronomical Institute of Muenster (AIM) with the slit 66.7×16.7 μm and steps Δx=8, Δy=30 μm. All of measured spectrograms are saved on a DAT tape in fits format.

Table 1. Data for 3C 390.3

Dates of obs.	Line(s)	Dates of obs.	Line(s)
21. 01. 71	H_β	17. 11. 74	H_β
22. 01. 72	H_β	18. 01. 75	H_β
12. 04. 72	H_β	06. 03. 75	H_β
16. 06. 72	H_β	13. 05. 75	H_β
08. 07. 72	H_β	02. 06. 75	H_β
13. 08. 72	H_β	03. 06. 75	H_β
05. 09. 72	H_β	06. 08. 75	H_β
05. 10. 72	H_β	28. 07. 76	H_β
14. 10. 72	H_β, H_α	24. 08. 76	H_β
02. 01. 73	H_β, H_α	27. 10. 76	H_β
03. 01. 73	H_β, H_α	22. 04. 77	H_β
26. 03. 73	H_β	24. 04. 77	H_β
10. 04. 73	H_β	20. 06. 77	H_β
04. 06. 73	H_β	21. 07. 77	H_β
05. 06. 73	H_β	08. 09. 77	H_β
05. 07. 73	H_β, H_α	09. 09. 77	H_β
30. 07. 73	H_β, H_α	18. 10. 77	H_β
03. 08. 73	H_β	02. 08. 78	H_β
24. 08. 73	H_β, H_α	07. 10. 78	H_β
28. 09. 73	H_β	08. 10. 78	H_β
29. 09. 73	H_β, H_α	03. 11. 78	H_β
20. 12. 73	H_β, H_α	28. 02. 79	H_β
24. 06. 74	H_β	31. 07. 79	H_β
18. 07. 74	H_β	14. 09. 80	H_β
18. 08. 74	H_β, H_α	10. 10. 80	H_β
20. 09. 74	H_β, H_α	03. 10. 81	H_β
21. 09. 74	H_β, H_α	17. 06. 83	H_β
16. 11. 74	H_β	31. 05. 84	H_β

For two galaxies (III zw 2 and Mrk 817) data are converted in ASCII format by using MIRA software of AIM. One spectrum contains from four to six ASCII files, depending on whether comparison spectra exists. In Figs. 1-4. the graphics of ASCII files for H_β of IIIZw 2 observed on October 2, 1981 are presented.

In Tables 1-5 the date and lines for 3C390.3, 3C120, Akn 120, III Zw 2 and Mkn 817 are presented.

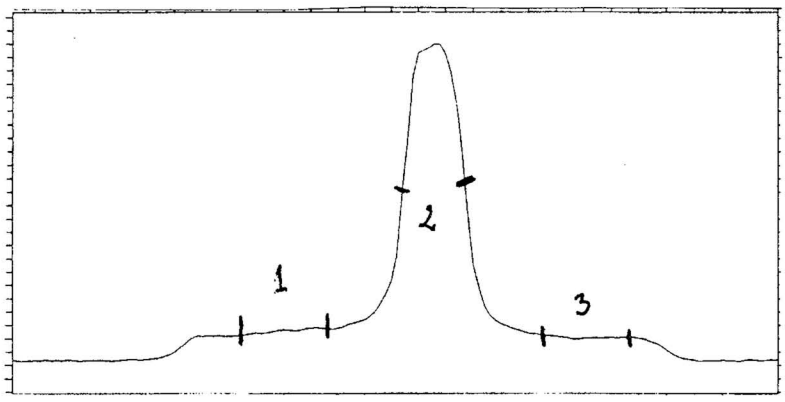

Fig. 1. Photometric profile of the scanned spectra perpendicular to the direction of dispersion. The regions from which next three graphics were taken are marked with short lines. 1 – corresponds to the region of night sky lines, 2 – spectra of IIIZw 2 and night sky lines, and 3 – night sky lines. The spectrum was obtained on October 2, 1981.

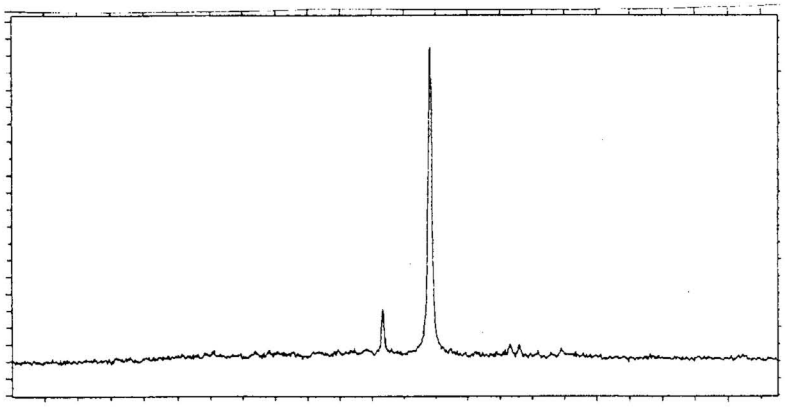

Fig. 2. Night sky lines, 1st region in Fig. 1.

Table 2. Data for Mrk 817

Dates of obs.	Line(s)	Dates of obs.	Line(s)
22. 04. 77	H_β	29. 05. 84	H_β
24. 04. 77	H_β	23. 05. 87	H_β
25. 04. 79	H_β, H_α	21. 06. 90	H_β
12. 07. 83	H_β	20. 07. 90	H_β
03. 02. 84	H_β	11. 07. 91	H_β

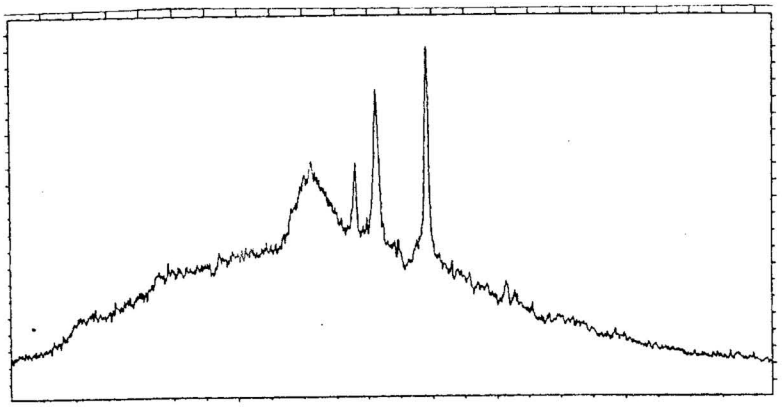

Fig. 3. H_β and O III lines of IIIZw 2 with night sky lines, 2nd region in Fig. 1.

Table 3. Data for 3C 120

Dates of obs.	Line(s)	Dates of obs.	Line(s)
06. 12. 72	H_β	08. 10. 80	H_β
04. 01. 73	H_β	12. 10. 80	H_β, H_α
20. 09. 74	H_β, H_α	10. 12. 80	H_β, H_α
14. 11. 74	H_β, H_α	05. 02. 81	H_β
15. 12. 74	H_β	02. 10. 81	H_β
13. 01. 78	H_β, H_α	03. 10. 81	H_β
07. 10. 78	H_β, H_α	24. 11. 81	H_β
24. 10. 78	H_β, H_α	25. 11. 81	H_β, H_α
01. 11. 78	H_β, H_α	15. 09. 82	H_β
02. 11. 78	H_β, H_α	21. 12. 82	H_β, H_α
30. 01. 79	H_β, H_α	11. 10. 83	H_β, H_α
25. 02. 79	H_β, H_α	02. 02. 84	H_β, H_α
26. 02. 79	H_β	03. 02. 84	H_β, H_α
27. 02. 79	H_β, H_α	23. 10. 84	H_β, H_α
19. 09. 79	H_β	22. 01. 85	H_β, H_α
11. 11. 79	H_β, H_α	22. 10. 87	H_β
14. 11. 79	H_β, H_α	24. 11. 87	H_β
17. 12. 79	H_β	21. 09. 90	H_β
15. 01. 80	H_β, H_α	09. 10. 91	H_β

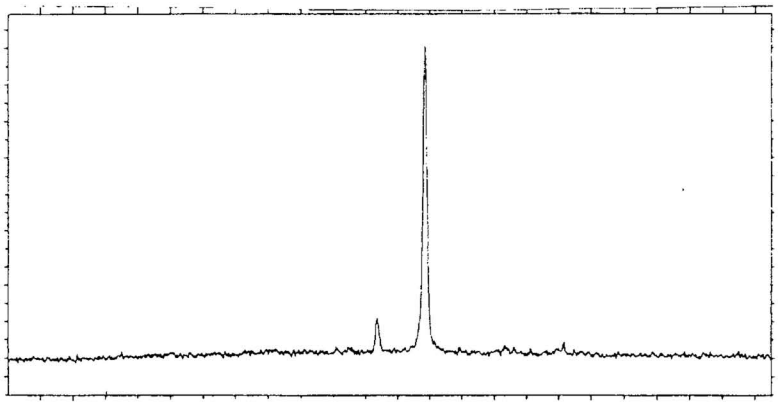

Fig. 4. Night sky lines, 3rd region in Fig. 1.

Table 4. Data for Akn 120

Dates of obs.	Line(s)	Dates of obs.	Line(s)
20. 01. 77	H_β, H_α	08. 03. 81	H_β, H_α
18. 10. 77	H_β, H_α	03. 10. 81	H_β, H_α
13. 01. 78	H_β, H_α	21. 11. 81	H_β, H_α
05. 02. 78	H_β	24. 11. 81	H_β, H_α
06. 03. 78	H_β	06. 01. 82	H_β, H_α
16. 07. 78	H_β, H_α	19. 01. 82	H_β, H_α
07. 10. 78	H_β, H_α	20. 01. 82	H_β, H_α
08. 10. 78	H_β, H_α	21. 12. 82	H_β, H_α
01. 11. 78	H_β, H_α	22. 12. 82	H_β, H_α
02. 11. 78	H_β, H_α	16. 03. 83	H_β, H_α
26. 02. 79	H_β, H_α	18. 03. 83	H_β, H_α
27. 02. 79	H_β, H_α	11. 10. 83	H_β, H_α
28. 02. 79	H_β, H_α	12. 10. 83	H_β, H_α
01. 03. 79	H_β, H_α	02. 02. 84	H_β, H_α
19. 09. 79	H_β, H_α	03. 02. 84	H_β, H_α
11. 11. 79	H_β, H_α	23. 10. 84	H_β, H_α
15. 11. 79	H_β, H_α	22. 01. 85	H_β, H_α
19. 02. 80	H_β, H_α	22. 01. 87	H_β, H_α
09. 10. 80	H_β, H_α	24. 11. 87	H_β, H_α
10. 12. 80	H_β, H_α	21. 02. 90	H_β, H_α

3. FUTURE PLANS

Future work with the spectra will cover:

1. Measurement and study of the widths and asymmetries of broad H_β and H_α emission lines as well as the narrow lines of O III will be carried on. In composite cases the broad and narrow components will be resolved and the gas motion in inner and outer layers of the emitting region indicated.

2. In spectra of some objects with good time-coverage (1971-1991) we will search for time variations of equvivalent width and asymmetry.
3. After certain previous results (Popović *et al.* 1994, 1995a, Atanacković-Vukmanović 1994), a possible gravitational influence on the spectral line profiles will be searched for. Following the approximative model (with the gravitational effect) given by Popović *et al.* (1995b) its improvement will be attempted.

Table 5. Data for III Zw 2

Dates of obs.	Line(s)	Dates of obs.	Line(s)
05. 09. 72	H_β, H_α	15. 09. 82	H_β
06. 12. 72	H_β, H_α	21. 10. 82	H_β
02. 11. 78	H_β	05. 09. 83	H_β
10. 01. 79	H_β	06. 09. 83	H_β
11. 11. 79	H_β	11. 10. 83	H_β
15. 11. 79	H_β	05. 11. 83	H_β
15. 01. 80	H_β	29. 08. 84	H_β
08. 10. 80	H_β	08. 3. 81	H_β
02. 09. 81	H_β	23. 10. 84	H_β
02. 10. 81	H_β	24. 11. 87	H_β
24. 11. 81	H_β	15. 08. 88	H_β
20. 01. 82	H_β	18. 09. 90	H_β

Acknowledgements

The author is grateful to Dr. Nina Polosukhina, Prof. Albert Bruch and Dr. Thomas Shimpke for their help during the selection and scanning of the spectrograms.

This work has been supported by Ministry for Developement, Science and Environment of Yugoslavia. Also, the work covers a theme (Research spectral line shapes in spectra of AGN) of the project "Astrometrical, Astrodynamical and Astrophysical Researchs" supported by Ministry of Science and Technology of Serbia.

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