

This article was downloaded by:[Bochkarev, N]
On: 29 January 2008
Access Details: [subscription number 788631019]
Publisher: Taylor & Francis
Informa Ltd Registered in England and Wales Registered Number: 1072954
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Astronomical & Astrophysical Transactions

The Journal of the Eurasian Astronomical Society

Publication details, including instructions for authors and subscription information:
<http://www.informaworld.com/smpp/title~content=t713453505>

The international cooperation of the Crimean
Astrophysical Observatory on the spectral and
photometric monitoring of active galactic nuclei
Pronik

Online Publication Date: 01 January 2003

To cite this Article: Pronik (2003) 'The international cooperation of the Crimean
Astrophysical Observatory on the spectral and photometric monitoring of active galactic nuclei', *Astronomical &
Astrophysical Transactions*, 22:4, 759 - 761

To link to this article: DOI: 10.1080/1055679031000096909

URL: <http://dx.doi.org/10.1080/1055679031000096909>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article maybe used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

THE INTERNATIONAL COOPERATION OF THE CRIMEAN ASTROPHYSICAL OBSERVATORY ON THE SPECTRAL AND PHOTOMETRIC MONITORING OF ACTIVE GALACTIC NUCLEI

V. PRONIK

Crimean Astrophysical Observatory, Nauchny, Crimea, Ukraine

(Received October, 14 2002)

The data bank of spectral and photometric observations of active Galactic nuclei (AGN) obtained during several decades and the data obtained during the last 10 years as a result of intensive AGN monitoring underlie the international collaboration of the Crimean Astrophysical Observatory.

Keywords: Galaxies; Active galaxies; Variability of continuum and emission lines

The spectral study of active Galactic nuclei (AGNs) at the Crimean Astrophysical Observatory began in 1963. The physical conditions in the nuclei of the Seyfert galaxies were investigated by Dibaj and Pronik (1965; 1967). The monitoring of spectral observations of AGNs at the 2.6 m Shajn telescope of the Crimean Astrophysical Observatory began in 1971 (Pronik and Chuvaev, 1972). It was carried out photographically using an optical intensifier attached to a Nathmit spectrograph. The correlation of the $H\beta$ flux variability and continuum variability was revealed for the Seyfert nucleus of Mrk 6.

The spectral data archives created by Chuvaev contain the photographic spectra of more than 200 Seyfert and Markarian galaxies. Many of these were observed for 20 years. The long rows of the profiles, equivalent widths and fluxes observations of the $H\beta$ and [O III] ($\lambda = 5007 \text{ \AA}$) lines for NGC 7469, NGC 5548, NGC 4151 and NGC 1275 were published in series of papers by Chuvaev (1980; 1985; 1990; 1991) and others.

The variability of the hydrogen line intensity in the Seyfert galaxies NGC 1275, NGC 3227 and NGC 7469 over several years was observed by I. Pronik (1974a,b; 1975a,b; 1983) with the high-speed spectrograph of the 2.6 m telescope. The variability of the Balmer decrement for $H\alpha$, $H\beta$ and $H\gamma$ on a time scale of 20 days was first studied by I. Pronik (1975a,b).

The changes in Seyfert type were observed for Mrk 6 by V. Pronik and Chuvaev (1972), for NGC 3227 by Pronik (1983), for NGC 4151 by Lyuty et al. (1984) and for NGC 7469 by Chuvaev et al. (1990).

Spectral observations of AGN have been performed on a charge-coupled device (CCD) spectrograph since 1988. The most intensive monitoring over 12 years was carried out for

NGC 4151, NGC 5548, NGC 7469, Mrk 6, Arp 102-B and 3C 390.3 by K. K. Chuvaev, Yu. F. Malkov, V. I. Pronik and S. G. Sergeev. The database in the Crimean Astrophysical Observatory contains about 2500 CCD spectra of AGNs.

Polarimetry of AGNs has been carried out at the Crimean Astrophysical Observatory since 1970 by V. Nikonov, Yu. Efimov and N. Shachovskoy (Efimov and Shachovskoy, 1972).

The photoelectric monitoring of the flux variability of some selected AGNs was begun in 1982 on the 1.25 m telescope by I. Pronik et al. (1990). Since 1989, monitoring of the Seyfert galaxies NGC 1275, NGC 4151, NGC 5548 and NGC 7469 has been carried out using the Jonson UBVRI system. Different characters of long-term variability were discovered for different active nuclei. Structure function analysis permitted us to show that intranight variations are characteristic not only for BL Lac objects but also for the ordinary Seyfert nuclei too and that intranight and extranight variations are caused by different sources. The results were published in more than 20 papers (see for example Merkulova et al. (1999; 2001), I. Pronik et al. (1999a,b) and Merkulova (2000; 2002).

Reviews on the spectral and photoelectric investigations of AGNs were given by Lyuty and Pronik (1975), I. Pronik (1980; 1987) and I. Pronik and V. Pronik (1992).

The studies of spectral and photometric material underlie the international cooperation at the observatory from 1994 in the framework of the international programme AGN WATCH and it is still in progress (for the last few years under a US Civilian Research and Development Foundation (CRDF) grant). Because of international cooperation the following equipment has been purchased by the Crimean Astrophysical Observatory under a CRDF Award No. UP1-2116.

A SBIG STV standard video and digital CCD camera has been installed at the Nesmith spectrograph of the 2.6 m Shajn telescope and used for telescope pointing and guiding. Our CRDF Award allowed us to develop a computer-controlled interface for the CCD spectrograph.

The Apogee AP7p CCD camera purchased under the CRDF Award has been installed at the primary focus of the 70 cm telescope to carry out BVRI photometric observations. The dimensions of field of the CCD camera are $15' \times 15'$. The Quantex control computer was specially configured to operate the AP7p and was assembled from spare parts from the computer at Ohio State University. The optical encoders have been installed on the 70 cm Crimean telescope and used during observations for automatically pointing the telescope.

The high-intensity monitoring of many AGNs has been carried out since December 2001 on the AP7 CCD photometer of the primary focus of the 70 cm telescope. The first result obtained with our new CCD photometer concerned the deep minimum of the NGC 5548 in 2002. An optical light curve unprecedented with high photometric precision and time resolution was obtained and compared with X-ray monitoring (Sergeev et al., 2002).

The data on spectral AGN observations obtained at the Crimean Astrophysical Observatory have been used in more than 20 papers published in *Astronomical Journal*, *Astrophysical Journal* and *Astronomy and Astrophysics* (Sergeev et al., 1994; 1997; 1999a,b; 2000a,b; 2001; Malkov et al., 1997).

A cooperative programme of polarimetric investigations of BL Lac objects at the Crimean Astrophysical Observatory with Finnish astronomers has been performed since 1981. About 40 papers in this field have been published in international journals.

A review of the results on AGN investigations from 1967 to 2000 has been presented at the international conference entitled *Astronomy in Ukraine 2000 and Beyond (Impact of International Cooperation)* in June 2000 (Efimov et al., 2000).

References

- Chuvaev, K. K. (1980). *Pis'ma Astron. Zh.*, 6, 323.

- Chuvaev, K. K. (1985). *Pis'ma Astron. Zh.*, 11, 803.
- Chuvaev, K. K. (1990). *Izv. Kriym. Astrofiz. Obs.*, 81, 138.
- Chuvaev, K. K. (1991). *Izv. Kriym. Astrofiz. Obs.*, 83, 194.
- Chuvaev, K. K., Lyuty, V. M. and Doroshenko, V. T. (1990). *Pis'ma Astron. Zh.*, 16, 867.
- Dibaj, E. and Pronik, V. (1965). *Astrofizika*, 1, 78.
- Dibaj, E. and Pronik, V. (1967). *Russian Astron. J.*, 44, 952.
- Efimov, Yu. S., Merkulova, N. I., Neshpor, Yu. I., Pronik, I. I., Pronik, V. I., Sergeev, S. G., Shakhovshoy, N. M. and Stephanian, A. A. (2000). In: Sherwood, V. and Plant, L. (Eds.), *Astronomy in Ukraine 2000 and Beyond (Impact of International Cooperation)*. Kyiv, Ukraine, June 5–8, p. 78.
- Efimov, Yu. S. and Shachovskoy, N. M. (1972). *Izv. Kriym. Astrofiz. Obs.*, 46, 3.
- Lyuty, V., Oknyanskij, V. and Chuvaev, K. K. (1984). *Pis'ma Astron. Zh.*, 10, 803.
- Lyuty, V. and Pronik, V. (1975). In: *Variable Stars and Stellar Evolution*, IAU Symposium, Vol. 67, Eds. V. Sherwood and L. Plaut, Reidel, Dordrecht, p. 591.
- Malkov, Yu. F., Pronik, V. I. and Sergeev, S. G. (1997). *Astron. J.*, 325, 904.
- Merkulova, N. I. (2000). *Astron. Astrophys.*, 119, 631.
- Merkulova, N. I. (2002). *Astron. Astrophys.*, 387, 40.
- Merkulova, N. I., Metik, L. P. and Pronik, I. I. (2001). *Astron. Astrophys.*, 374, 770.
- Merkulova, N. I., Pronik, I. I. and Metik, L. P. (1999). *Astron. Astrophys.*, 117, 2177.
- Pronik, I. I. (1974a). *Russ. Astron. J.*, 51, 475.
- Pronik, I. I. (1974b). *Russ. Astron. J.*, 51, 1204.
- Pronik, I. I. (1975a). *Russ. Astron. J.*, 52, 481.
- Pronik, I. I. (1975b). In: Sherwood, V. and Plant, L. (Eds.), *Variable Stars and Stellar Evolution*, IAU Symposium, Vol. 67, Reidel, Dordrecht, p. 605.
- Pronik, I. I. (1980). In: *Variability in Stars and Galaxies*, Proceedings of the 5th European Astronomical Meeting, Institut d'Astrophysique, Liege, P.C.1.1.
- Pronik, I. I. (1983). *Izv. Krym. Astrofiz. Obs.*, 68, 81.
- Pronik, I. I. (1987). In: Khachikian, E. J., et al. (Eds.), *Observational Evidence of Activity in Galaxies IAU Symposium*, Vol. 121, Reidel, Dordrecht, p. 169.
- Pronik, I. I., Merkulova, N. I. and Metik, L. P. (1990). *Astrophys. Space Sci.*, 171, 91.
- Pronik, I. I., Merkulova, N. I. and Metik, L. P. (1999a). *Astron. J.*, 117, 2141.
- Pronik, I. I., Merkulova, N. I. and Metik, L. P. (1999b). *Astron. Astrophys.*, 351, 21.
- Pronik, I. I. and Pronik, V. I. (1992). *Astron. Astrophys. Trans.*, 3, 57.
- Pronik, V. and Chuvaev, K. (1972). *Astrofizika*, 8, 187.
- Sergeev, S. G., Malkov, Yu. F., Chuvaev, K. K. and Pronik, V. I. (1994). In: Gondhalekar, P. M., Horne, K. and Peterson, B. M. (Eds.), *Reverberation Mapping of the Broad-Line Region in Active Galactic Nuclei*, ASP Conference Series, Vol. 69, Edinburgh, UK, p. 199.
- Sergeev, S. G., Pronik, V. I., Malkov, Yu. F. and Chuvaev, K. K. (1997). *Astron. Astrophys.*, 320, 405.
- Sergeev, S. G., Pronik, V. I., Malkov, Yu. F. and Sergeeva, E. A. (1999a). *Astron. Astrophys.*, 341, 740.
- Sergeev, S. G., Pronik, V. I. and Sergeeva, E. A. (2000a). *Astron. Astrophys.*, 356, 41.
- Sergeev, S. G., Pronik, V. I. and Sergeeva, E. A. (2001). *Astrophys. J.*, 554, 245.
- Sergeev, S. G., Pronik, V. I., Sergeeva, E. A. and Malkov, Yu. F. (1999b). *Astron. J.*, 118, 2658.
- Sergeev, S. G., Pronik, V. I., Sergeeva, E. A. and Malkov, Yu. F. (2000b). *Astrophys. J., Suppl. Ser.*, 121, 159.