Multiwavelength AGN Surveys and Studies
Proceedings IAU Symposium No. 304, 2013
A. M. Mickaelian & D. B. Sanders, eds.

doi:10.1017/S1743921314003895

Investigation of Distant Quasars

Martik Hovhannisyan[1], R. Andreasyan[2], G. Paronyan[2] and H. Abrahamyan[2]

[1]Institute of Applied Problems of Physics, Yerevan, Armenia
email: martik@bao.sci.am

[2]Byurakan Astrophysical Observatory (BAO), Armenia

Abstract. To study physical and morphological characteristics of distant quasars we carry out radio-optical investigation of 30 quasars from the Cambridge 7C catalogue second area (0.097 square radians). All these objects have angular sizes less than 1 arcsec on 102 MHz images. Average values of absolute magnitudes and spectral indices have been calculated for them (M $= -26.51 \pm 0.25$, a $= 0.66 \pm 0.25$). It was shown that 60% of compact radio sources from the FIRST catalogue (1400 MHz) are candidates of distant quasars.

Keywords. AGN, QSO, radiogalaxies.

The discovery and studies of quasars are important to determine the nature of certain physical processes in the universe. The spatial distribution of these objects shows that they are distributed throughout the Metagalaxy (Artyukh *et al.* 1996, 1998). Finding distant quasars (z>1) is quite challenging. The studies of quasars show that the known quasars with powerful radio fluxes (approximately 8–10% of quasars) are mainly identified with the compact radio sources. Therefore, the study of compact radio sources allows us to apply a simple method for finding distant quasars. Our proposed method makes it possible to detect such radio quasars.

Observations in the interplanetary plasma by scintillation method at the 102 MHz frequency made it possible to highlight compact radio sources which are smaller than 1 arcsec. Further identification of shimmering compact radio sources with optical sources revealed that approximately 60% of these objects are radio quasars (Cutri *et al.* 2012).

As a result of observation at 102 MHz frequency by scintillation in the second area of Cambridge 7C catalogue (7C II), a large number of compact radio sources that have dimensions less than 1 arcsec was found (Becker *et al.* 1997). To exclude observational selection, the studied radio sources were selected by the following principles: objects were selected hsaving at least one shimmering component and angular size of not larger than 1 arcsec. Then we select those sources, which have identification in the FIRST and SDSS catalogues. For the original list (in 7C II) of 289 radio sources there are only 68 radio sources, which have identification in FIRST and SDSS catalogues (Condon *et al.* 1998). 42 of them are quasars and 26 are radio galaxies. In this paper, we have done optical and radio investigation for these 30 quasars.

For these quasars we can say that 17 of these sources at 1400 MHz have only one very compact radio component, and 13 have extended components or consist of more than one component.

In the optical range all 30 sources are star-like objects. Having optical spectra, we learned which spectral lines are characteristic for quasars. In Fig. 1 we show the distribution of the number of objects in respect with the observed spectral lines. In this figure we can see which elements are characteristic for quasars.

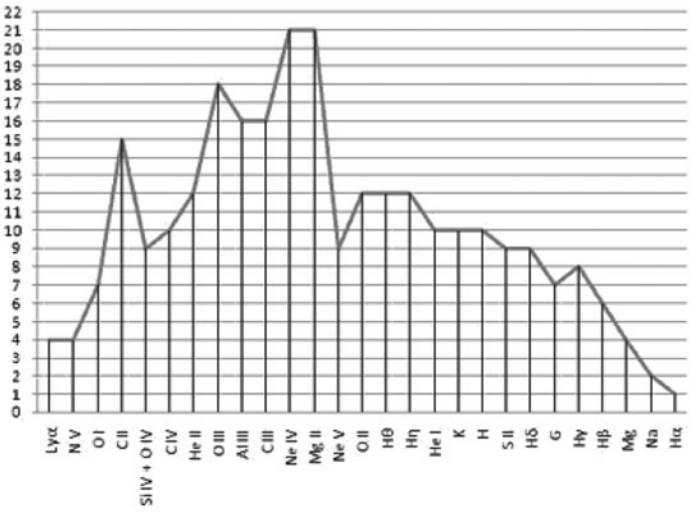

Figure 1. Distribution of the number of objects in respect with the spectral lines.

Summarizing the results obtained in the present study, we can say the following: in 7C II area with our method we distinguished radio sources of which approximately 60% are quasars.

In this paper we have used observations obtained by the scintillation method of the interplanetary plasma at 102 MHz in order to prove that over 60% of compact radio sources from FIRST catalogue are quasars. Therefore, we propose a simple method for finding candidates for quasars using only a FIRST catalogue (1400 MHz frequency). Note that only 8–10% of the known quasars have powerful radio fluxes. Therefore, our method is suitable only for finding candidates for distant radio quasars.

References

Artyukh, V. S. & Tyul'bashev, S. A. 1996, *Astron. Rep.* 40, 601

Artyukh, V. S., Tyul'bashev, S. A., & Isaev, E. A. 1998, *Astron. Rep.* 42, 283

Becker, R. H., Helfand, D. J., White, R. L., Gregg, M. D., & Laurent-Muehleisen, S. A. 1997, *ApJ* 475, 479

Condon, J. J., Cotton, W. D., Greisen, E. W., Yin, Q. F., Perley, R. A., Taylor, G. B., & Broderick, J. J. 1998, *AJ* 115, 1693

Cutri, R. M. *et al.* 2012, *IPAC/Caltech*

https://doi.org/10.1017/S1743921314003895 Published online by Cambridge University Press