Astrophysical Spectroscopy of Extragalactic Objects. Research at the Belgrade Astronomical Observatory

L. Č. Popović1, D. Ilić2
1Astronomical Observatory, Volgina 7, 11000 Belgrade, Serbia
2Department of Astronomy, Faculty of Mathematics, University of Belgrade, Studentski trg 16, 11000 Belgrade, Serbia

Abstract. We present here activities on the project “Astrophysical Spectroscopy of Extragalactic Objects” financed by the Ministry of Science of Serbia within 2002-2005 period.

1 Introduction

The scientific research at the Astronomical Observatory has been variously organized in the different time periods. It was mainly done in the scientific groups that were working on one specific subject. In the nineties of the previous century, there was only one project that covered all the research that was performed at Belgrade Astronomical Observatory (AOB). However, after 2001, the Ministry of Science of the Republic of Serbia has made a call for proposals, where it has put in favor small and well defined projects. In that way, conditions were made to propose several projects from the AOB (9 projects were performed and all 9 were accepted). One of these project is “Astrophysical Spectroscopy of Extragalactic Objects” which will be discussed further in the following text.

We would like to point out here our reasons for making this report:

1. The project has lasted from 2002. to 2004., and it was extended to 2005. In the 2006. new 4-year projects have started, therefore this an excellent opportunity to make a retrospective of this project;

2. Even though yearly reports were sent regularly to the Ministry, a complete summary of the project activities have not been made;

3. From the historical point of view many activities, if not recorded somewhere, are forgotten after some period of time, therefore this text should be some sort of reminder to all the participants in this project. On the other hand, we would like to make this report in order to easily compare future with previous results, as well as for the other to compare their achievements with ours and viceversa.
Also, we would like to emphasize that researches that were done through this project have never been done before in Serbia, therefore with this project another important and up to date subject was started in Serbia.

2 Researchers on the Project

In the period from 2002 to 2005, 12 researchers were working on this project. The coordinator of the project was L. Č Popović, and the researchers are:

2. Nataša Gavrilović (born 1979, AOB) started in 2005, total 3 RM
5. Katarina Kovač (born 1976, MFB) only in 2002, total 8 RM
7. Luka Č. Popović (born 1964, AOB) 2002-2005, total 40 RM

It is interesting to make a small statistical analysis of the participants in this project. For the total of 4 years, 12 researchers worked for 226 research months, thus 22.2 years. Mainly young researchers were engaged, therefore the average age was around 34 years (or year of birth 1970). For all the duration of the project the following researchers were engaged: Edi Bon, Milan Dimitrijević, Dragana Ilić, Predrag Jovanović, Luka Popović and Saša Simić.

3 Activities

With the aim to achieve the project objectives, in the period from 2002 to 2005, the following activities were performed:

1. Scientific theoretical and experimental research, together with the education of young researcher, in three fields:
(a) investigation of the kinematical and physical properties of active galactic nuclei and stellar systems in other galaxies;
(b) b) investigation of the influence of the microlensing effect on the spectra of quasars;
(c) c) explaining (modeling) phenomena of the gamma ray burst;

2. Performing observations;

3. Research visits to international institutions and participation in international Conferences;

4. Popularization of science (through seminars and public lectures);

5. International cooperation - visits to AOB of foreign scientists and vice-versa, planning and writing proposals for future bilateral and multilateral projects;

6. Organizing Conferences;

7. Systematizing and publishing research results (see references in Appendix).

The main results of all these activities in the period 2002-2005 are:

— Defended two PhD thesis (see references Samurović 2004, Jovanović 2005);
— Defended two Master thesis (see references Stanić 2002, Ilić 2005);
— Defended one Diploma thesis at the University of Padova, Italy (see references La Mura 2005);
— Published 128 bibliographic papers;
— Performed radio observation of the active galaxy Akn 120 with European VLBi network (data reduction is in progress);
— Performed spectroscopical observation (in optical band) with the Isaac Newton telescope (Canary Islands, Spain) and 2m telescope at Rozhen Observatory (Bulgaria);
— International project “Virtual Observatory for investigation of the galaxy origin” between Serbia and France, Program “Pavle Savić”, approved for the period 2006-2007;
— Participation to 16 international and national conferences and workshops;
— 3 Research visits (more then 15 days);
— Organization of the 4th and 5th Serbian Conference on Spectral Line Shapes in Astrophysics (Arandjelovac 2003, Vršac 2005);
— Visits of 9 foreign scientist (collaborators on project);
— Established wide international cooperation (Bulgaria, Russia, Germany, Spain, Italy, France, USA).

4 Financing the Project

As it was mentioned previously this project was approved by the Ministry of Science of the Republic of Serbia, therefore it was financed by that institution. The detailed financial structure of this project is given in the Table 1.

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<tbody>
<tr>
<td>Honoraria for the researchers</td>
<td>1,995,940 DIN</td>
<td>Honoraria for the researchers and expenses of the institution</td>
<td>3,183,174 DIN</td>
<td>12,555,535 DIN</td>
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<td>Expenses for travels, materials, equipment...</td>
<td>517,000 DIN</td>
<td>Expenses for travels, materials, equipment...</td>
<td>88,709 DIN</td>
<td>(~170,000 EUR)</td>
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<td>Expenses of the institution</td>
<td>830,352 DIN</td>
<td>SUB-TOTAL</td>
<td>3,271,883 DIN</td>
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<tr>
<td>SUB-TOTAL</td>
<td>3,343,292 DIN</td>
<td>SUB-TOTAL</td>
<td>3,271,883 DIN</td>
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As it can be seen from Table 1, almost all financial support from the Ministry was spent on the researcher’s salaries, 40% were spent on administrative expenses, and only a small part was spent on travels, materials, supplies and equipment.

5 Conclusions

We are going to use statistic again to present our work on this project. As we already mention, the average age of the researcher was 34 year, that is a usual age for a post-doc. If we take that for 22.2 years of work, the Ministry has supported the project with 170,000 EUR, which is approx. 8,000 EUR per year.
per a researcher. In the same time, the same researcher in the European Union would have yearly incomes of around 30,000 EUR, therefore it is pretty clear in what position are researchers in Serbia. On the other hand, that researcher is published 6 bibliographic papers per year, that is comparable with the results of his colleagues from the European Institutes. The conclusion is left for the readers to make.

Appendix

Defended dissertations


Papers in the leaded international journals

Astrophysical Spectroscopy of Extragalactic Objects. Research at AOB


15. Čirković, M. M. 2002, Laudatores Temporis Acti, or Why Cosmology is Alive and Well - A Reply to Disney, General Relativity and Gravitation, 34, pp. 119-130


Papers in the international journals


L. ˇC. Popovi´c, D. Ili´c


14. Urošević, D. 2002, Updated σ-D Relations and Main Radio Loops as SNRs, Ukrainian Journal of Physics, 47, pp. 301-306


23. Ćirković, M. M., Cvetičanin, S. 2002, Backward Causation, Isolation and the Pursuit of Justice, Epistemologia, 25, pp. 142-165
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Papers presented on conferences and printed in the Proceedings


38. Ćirković, M. M. 2003, Baryonic dark matter - structure and dynamics, Invited lecture at the Fifth General Conference of the Balkan Physical Union BPU-5, ed. by S. Jokić, I. Milošević, A. Balaž, and Z. Nikolić (Serbian Physical Society, Belgrade), pp. 135-144


L. Č. Popović, D. Ilić


Papers presented on conferences and printed in the Book of Abstracts


Astrophysical Spectroscopy of Extragalactic Objects. Research at AOB


Invited lectures


Conferences

1. XIV NATIONAL CONFERENCE OF ASTRONOMERS OF SERBIA AND MONTENEGRO, October 12 - 15, 2005, Belgrade, Serbia and Montenegro

2. European and National Astronomical Meeting JENAM 2005, DISTANT WORLDS, 4-7 July 2005, Liege, Belgium

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3. ASTROPHYSICAL SOURCES OF HIGH ENERGY PARTICLES AND RADIATION, June 20 - 24, 2005, Torun, Poland
4. 5th Serbian Conference on Spectral Line Shapes in Astrophysics. Vršac, June 6-10, 2005 (Local Organizing Committee)
5. Workshop - Multiband Approach to AGN, September 30 - October 02 2004, Bonn, Germany
6. IAU Symposium 225 - IMPACT OF GRAVITATIONAL LENSING ON COSMOLOGY, 19-23 July 2004, Lausanne, Switzerland
7. 17th International Conference on Spectroscopic Line Shapes, June 21-25 2004, Paris, France
8. 4th Serbian-Bulgarian Astronomical Conference (IV SBGAC), 21-24 April 2004, Belgrade, Serbia (Local Organizing Committee)
11. Vseruska Astronomicheskaya Konferentsiya (VAK-2004), 3 - 10 June 2004, Moscow, Russia
13. IV Serbian Conference on Spectral Line shapes, 10 - 15 October 2003, Arandjelovac, Serbia (Local Organizing Committee)
15. XIII National Conference of Yugoslav Astronomers, 17 - 20 October 2002, Belgrade, Serbia (Local Organizing Committee)
16. 21st Summer School and International Symposium on the Physics of Ionized Gases, Sokobanja, Yugoslavia, August 26-30, 2002

Other activities

Luka Č. Popović:

Astrophysical Spectroscopy of Extragalactic Objects. Research at AOB

- PI (Principal Investigator) in the observation of the active galaxy Akn 120 with European VLBI network (in the project, besides AOB, participate scientist of the Max-Planck Institute for Radio astronomy in Bonn).

Dejan Urošević:

- Editor of the international journal “Serbian Astronomical Journal” (since 2002).
- Supervisor of two Master thesis.

Predrag Jovanović