

ASTRONOMY EDUCATION IN FR YUGOSLAVIA 1993 – 1996

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Abstract. This report contains a review of changes introduced in astronomy education in Yugoslavia within the last three years and the facts collected within this period, not known to the author at the time the previous report was written.

1. GENERAL INFORMATION

Astronomy education in Yugoslavia follows the pattern of education in general: it is a subject upon which each republic may decide independently. Astronomy education in Serbia and Montenegro is somewhat different at some levels.

Unless stated otherwise, the period concerned covers the interval from the 1st of June 1993 till the 1st of June 1996.

2. ELEMENTARY SCHOOLS

No substantial changes have occurred in elementary school programs concerning astronomical topics in the period reported.

3. SECONDARY SCHOOLS

No changes occurred in majority of secondary schools within the last three years. Astronomy topics are incorporated in Physics and partly in Geography, according to the law passed in 1990. The program is the same for normal secondary schools in Serbia and Montenegro. There are only about twenty astronomers and astrophysicists working in secondary and elementary schools in Serbia. The situation concerning teaching is more difficult in Montenegro because there are no graduated astronomers working in education. Generally, the following flaws are present:

I Most of the teachers are physicists and they feel astronomy as a burden.

II In some schools, physics is taught by physico-chemists with no astronomical education.

III Astrophysicists, who have right to teach physics and astronomy are rather rare.

IV Since astronomers have no legal right to teach physics, they have no right to teach astronomy in physics either!

The situation with astronomy is slightly better in the special Mathematical High School (Matematička gimnazija), and equivalent classes attached to *gimnazija* type

of schools. They have astronomy as a separate course with one lesson per week, and pupils get separate marks. Such classes exist in: gimnazija "Jovan Jovanović-Zmaj" in Novi Sad, gimnazija "Svetozar Marković" in Niš, I gimnazija in Kragujevac, gimnazija in Kruševac and gimnazija in Valjevo. Astronomy was included in physics in such schools only in the school year 1993/94. "Matematička gimnazija" in Podgorica has astronomy as an optional subject with two lectures per week, in the last year of study. Astronomy in "Matematička gimnazija" in Beograd is taught by an astronomer while in other cases it is taught by physicists.

The textbook for such a programme was prepared by M. S. Dimitrijević and A. Tomić. The first edition was printed in 1994, the second in 1995.

Physics was reduced to acoustics in musical schools last year and excluded from economical schools this year. Thus no astronomy is there any more.

In order to help secondary school teachers to keep in touch with new achievements in astronomy and with ways of teaching astronomy, special lectures were presented at regular yearly meetings of teachers. Altogether 9 lectures by 8 astronomers had been held since the previous report. Some of them were written, and cover 41 pages. In August 1993 a special two days meeting devoted to astronomy was held with 8 astronomy lectures.

4. UNIVERSITY EDUCATION

There are 6 universities in Yugoslavia.

The University of Beograd is the only one with a Department of Astronomy. Here, there were no changes in the programme of studies within the past three years. Seven students graduated in the astrophysical division and three in the astronomical one. Four postgraduate students obtained M.Sc. degrees and one a Ph.D. degree.

Starting from the foundation of the Faculty of Sciences in 1947, the Department of Astronomy educated 148 graduated students, 36 led to M.Sc. and 21 to Ph.D. degrees. Seven graduated astronomy students received M.Sc. degrees in the Department of Physics and four obtained there Ph.D. degrees. The corresponding numbers for those who obtained these degrees abroad are 1 and 5, respectively. Five graduated physicists obtained higher degrees on astrophysical subject: two M.Sc. degrees abroad, two Ph.D. degrees in the Department of Physics and one abroad. The data are given for those who are still in touch with Yugoslav astronomy institutions. Some physicists work in astronomy and vice versa.

The University of Novi Sad has since 1986, one semester (VIII) course "Astrophysics and Astronomy", with two 45 minutes lectures and two times 45 minutes of exercises per week. It is obligatory for students who intend to become teachers, and optional for students of Applied Physics. The examination consists of a written paper and an oral. An average number of students following the course is 10 - 15 per year.

The Department of Physics of the University of Niš had from 1990/91 to 1993/94 a two semester course (VII and VIII) "Fundamentals of Astrophysics" with two 45 minutes lectures per week. It was taught to students of the General Physics Division. The total number of students who passed exams is 20. After changes of the plans, astrophysics was excluded for two years, being again introduced recently. It will start as one semester course (VII) in autumn 1996/97.

The professors of astrophysics in Novi Sad and Niš are plasma physicists.

The Department of Chemistry on the University of Niš has within postgraduate studies some topics related to astrophysics. There is a chair for Geo- and Cosmochemistry interested in meteors and meteorites.

The Universities of Kragujevac, Priština and Podgorica had no astronomy courses.

The University of Priština recently elected a professor of Mathematical Geography, who is known by his interest in astronomy.

Two university text books were recently published; "Theoretical Astrophysics" by M. Vukićević-Karabin, in 1994, in Beograd, and "Astrophysics and Astronomy" by B. Vujičić and S. Đurović, in 1995, in Novi Sad.

5. PUBLIC EDUCATION

Public astronomy education in Yugoslavia had been realized by lectures at public universities, on Radio and TV programmes, in popular journals, in the Planetarium, in astronomical societies and their observatories.

Kolarčev Public University in Beograd within the last three years organized 4 sets of lectures: "Astronomers – Nobel prize winners" in spring 1994, "Collisions in the Solar System" in December 1994, "Astronomers and Psychologists about Astrology" in April 1995 and "Cosmology" in May 1995.

The Astronomical Society "Ruder Bošković" in Beograd organized courses every autumn and spring, with total number of 8422 participant summed over lectures in the last three years. There were 31 participants who passed the final examination, within the same period. The telescope and its functioning were demonstrated to 729 visitors. Its Planetarium had 19 810 visitors, mainly pupils, in the period presented.

The Astronomical Society "Novi Sad" organized two 12 lectures courses, about 25 public observations, 20 exercises for pupils and 2 for geography students, per year. There were about 2400 visitors within this interval.

A new astronomical society named "Niš" was founded in Niš this spring.

The Astronomical Society "Ruder Bošković" organized the Beograd Astronomical Weekend (BAV) in June 1993, 1994 and 1995. The XIV BAV (1996) is in the course of preparation. The XI BAV (1993) was devoted to Nikola Tesla and commemorated 50 years since his death, although other subjects were presented, too. The XII BAV (1994), apart from lectures, had even some theatre performances connected to astronomy. The main themes of the XIII BAV (1995) were impacts in the Solar system and extraterrestrial life. They were followed by visits to observatories and by observations. All the courses were run by the staff of these institutions, professional astronomers and partly by astronomers amateurs.

The Astronomical Society "Ruder Bošković" published 18 issues of its non profit journal for popularization of astronomy "Vasiona", in the period reported. Six issues were double. After problems in the 1992 - 1995 period, a regularity in publishing was achieved this spring, when issue 1-2 for 1996 appeared out of press in time for the comet Hyakutake and the April lunar eclipse, with corresponding information. Out of 49 major articles, 4 were written by students as a part of their teaching practice.

The Petnica Science Center (PSC) for the young developed, within last four years

a two-years astronomy programme. An average number of participants starting programmes was about 50. Later, the number decreased to 20, at the most. The PSC published 2 issues of "Papers of participants in educational programmes" within "Petničke sveske" (Petnica Notes), in the period reported. There were 10 astronomical papers in the 1993 issue and 7 in the 1994 issue. The PSC also published 2 booklets on observations of Perseids and one with instructions on the observations of the Sun.

The organization "Nauku mladima" (Science to the Young) had in the last three years about 13 000 pupils participating in competitions by tests. About a hundred of the best pupils participated in higher level competitions by doing projects. Twelve of them got medals, and one project is to be published.

The Astronomical Observatory in Beograd, the public observatories of the Astronomical Societies in Beograd and Novi Sad, the Belerofont observatory of the Faculty of Sciences in Kragujevac and the PSC astronomy division were acting in education.

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