

## ASTRONOMY EDUCATION IN SERBIA 2008-2011

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**Abstract.** A review is given of triennial activities in astronomy education in Serbia at all levels. Astronomy makes part of the primary and secondary school curricula, but still neither as a separate nor as a compulsory subject. In the past three years the programs at all five state universities in Serbia were accredited. Among the general public, the interest for astronomy is steadily increasing, and four new amateur astronomical societies have been founded. Serbian teams continued to successfully participate in the International Astronomy Olympiads.

This paper presents the changes introduced in astronomy education from 1 September 2008 to 1 November 2011. The previous period was covered in the papers by Atanacković (2009), Atanacković-Vukmanović (2006a, 2006b) and by Milogradov-Turin (2002) and references therein.

### 1. PRIMARY SCHOOLS

In the elementary school curricula astronomy topics are taught as part of the courses of Natural History, Geography and Physics.

Within the current reform of primary school education, three astronomy lectures: "Observations of celestial bodies", "Solar and lunar eclipses" and "Eratosthenes' measurement of the Earth's circumference" have been introduced as additional topics in the 8th year physics course curriculum.

### 2. SECONDARY SCHOOLS

Astronomy has not been reintroduced in the secondary school curricula as a separate and compulsory course in the 4th year with one class hour per week, even though it was announced 3 years ago. It is worth to remember that after 25 years (from 1969 to 1994) being a separate fourth year one hour per week course, in 1990 astronomy topics became incorporated as topics of fourth year physics courses. Attempts have been made to reintroduce astronomy as a separate and compulsory subject, but still without success.

At regular annual meetings of physics teachers organized by the Serbian Physical Society, only one lecture (Aničin 2010) on topics related to astronomy was given in the previous period. In August 2011, the Department of Physics at the Faculty of

Natural Sciences of the University of Niš organized a seminar of the SEENET-MTP network for Teachers from Balkans "Trends in Modern Physics" (Stanković 2011).

## 2. 1. INTERNATIONAL ASTRONOMY OLYMPIADS (IAO AND IOAA)

In 2002, Professor J. Milogradov-Turin (Milogradov-Turin 2003), then president of the Society of Astronomers of Serbia (SAS), initiated the participation of Serbia in the International Astronomical Olympiad (IAO). Since 2004 the National Astronomical Olympic Committee (NAOC) has been in charge of training, testing and selection of the national team.

There are two International astronomy olympiads: IAO (International Astronomy Olympiad, since 1996) and IOAA (International Olympiad on Astronomy and Astrophysics, since 2007).

The results of the participation of the Serbian team at Astronomy Olympiads since 2002 (Ninković 2011) are given in Table 1.

Table 1. Participation of the Serbian team at Astronomy Olympiads. The number of participants given in the third column pertains to senior + junior + automatically qualified (winers from the previous Olympiad).

year	Olympiad	participants	I diploma (gold)	II diploma (silver)	III diploma (bronze)	special prize + recognition
2002	IAO	2+0	0	0	2	0
2004	IAO	2+0	0	1	1	0
2005	IAO	2+3	0	0	2	0
2006	IAO	2+3	2	0	2	1+0
2007	IAO	2+3+2	2	2	3	0
2008	IAO	2+3+3	0	2	3	0
2009	IOAA	4	0	3	0	1+1
2009	IAO	2+2	0	0	1	0
2010	IOAA	5	1	2	1	0+1
2010	IAO	2+3	1	1	2	0
2011	IOAA	5	0	2	1	0+1
2011	IAO	2+1+2	0	0	3	0
total			6	13	21	2+3

## 3. UNIVERSITY EDUCATION

Astronomy courses are taught at five state universities in Serbia (University of Belgrade, University of Novi Sad, University of Niš, University of Kragujevac and University of Priština in Kosovska Mitrovica). According to the act passed in September 2005, the new European Credit Transfer System (ECTS) is introduced. In the course of past three years the studies have been accredited at all state universities in Serbia.

**The University of Belgrade** is still the only university with the Department of Astronomy (at the Faculty of Mathematics - FM). Students can major in astronomy from the first study year.

So far 265 students have graduated from the Department of Astronomy at the University of Belgrade, 12 students received Master degree, 69 students received MSc degree and 38 students - PhD degree.

Since 2006/2007 academic year study programs of Astronomy and Astrophysics have been adjusted to the new ECTS. Model 4+1 for the first two degrees (Bachelor and Master) was accepted. The third (PhD) degree consists of compulsory and elective courses at the first two years, while the third year is intended only for the work on the PhD thesis itself.

In 2009/2010 the studies were accredited at the Faculty of Mathematics and the study program in astronomy was changed. New accredited study program "Astronomy and astrophysics" consists of 3 programs (Computational mechanics and astrodynamics, Astrophysics, Astroinformatics) at undergraduate (4 years) level, 2 study programs (Astronomy, Astrophysics) at Master studies and one study program (Astronomy and Astrophysics) at PhD studies.

After 4 study years (240 ECTS) students get degree Bachelor in Astronomy, after 1 year of Master studies (60 ECTS) - Master astronomer degree, and after 3 years of PhD studies (180 ECTS) - PhD in astronomy degree.

In the past three years, 21 students graduated in Astrophysics and 4 in Astronomy. In total, 10 master, 3 MSc and 7 PhD theses have been defended. Every year, on November 8, the best student of the generation received the "Prof Zaharije Brkić" award.

Since 2011/2012 the Faculty of Mathematics participates in "AstroMundus", a 2-year common master program in astronomy and astrophysics of 5 universities (Innsbruck (coordinator), Rome, Padova, Gottingen and Belgrade).

At the Faculty of Mathematics astronomy is also taught as a compulsory course "Introduction to astronomy" (3rd study year) for the students of L division (mathematics and informatics teachers), as an elective course "Selected topics in astronomy" (4th year) for all students of Mathematics and in two elective courses "Stellar astronomy" and "Ephemeris astronomy" (1st/2nd year) for the students of Informatics.

At the Faculty of Physics astronomy is taught as part of the curriculum with a compulsory one-semester course "Fundamentals of astrophysics" at the 1st year of master studies for physics teachers division, and an elective one-semester course under the same name for the students of the 1st year of B (theoretical) division and for the students of the 2nd or the 3rd year of A (general) division.

At the Faculty of Civil Engineering, a compulsory course "Geodetic astronomy" (4th year) is taught. At the Faculty of Geography, some astronomical topics are taught within the first-year course "Mathematical Geography" (Tadić 2011).

The students of the Department of Astronomy have the training in observations at the Belgrade Observatory and at the Ondrejov Observatory (Czech Republic, since 2007). In the near future they are going to use also the facilities (Astro Optic 60cm reflector) at the Astronomical Station on the mountain Vidojevica.

The Department of Astronomy continued to organize regular seminars on different topics in astronomy on every second Tuesday throughout the academic year, so that 44 seminars have been held since the XV NCAS. Eighteen seminars were also held at

the Astronomical Observatory in Belgrade.

The 5th Astronomy Students Workshop (ASW) was held in November 2011 at the Public Observatory of the AS "Rudjer Bošković" in Belgrade. The ASWs have been organized since 2007 by the Department of Astronomy in Belgrade, the Department of Physics in Novi Sad and Astronomical Observatory in Belgrade, aimed at improving contacts between the students of astronomy from Belgrade and Novi Sad.

The Department of Physics of the Faculty of Natural Sciences (FNS) at **the University of Novi Sad** has started studies of astronomy in the 2002/2003 academic year, introducing simultaneously the European Credit Transfer System (ECTS). Firstly, the model 3+1+1 was accepted. Since 2008/2009 new accredited studies are of the model 3+2, which is in accordance with other study groups at the Department of Physics. After 3 study years (180 ECTS), students get the degree "Physicist - astronomer", and after 5 study years (300 ECTS) the degree "Graduated physicist - astronomer - master". The novelty is that students of all divisions have 2-3 common compulsory courses (general physics, mathematics, introduction to theoretical physics, atomic, nuclear physics, physics of condensed matter, etc.) in each semester. Many of the disciplines of astronomy and astrophysics are taught within one-semester elective courses to the students of other study programs at the Department of Physics (e.g. courses "Fundamentals of the Solar system" (1st year) and "Egzobiology" (2nd year) for the students of physics at the undergraduate level or one-semester courses "History of astronomy", "Interstellar medium", Extragalactic astronomy and cosmology", "Astrochemistry", "Planetology" etc.) at the master studies in physics).

So far 18 students have graduated from the astronomy study group of the Department of Physics at the University of Novi Sad. Fourteen students got 3-year diploma, 3 students got 4-year diploma and 1 student got his Master degree.

In the past three years 26 students enrolled astronomy studies at the Faculty of Natural Sciences in Novi Sad. Eleven students got 3-year diploma and one student received the Master degree (Lukić - Petrović 2011).

The students of astronomy in Novi Sad also have the summer practice in observations and data reduction at the Ondrejov Observatory.

At the Department of Geography of the FNS in Novi Sad, a course "Mathematical geography with the fundamentals of astronomy" is taught in the first study year (Tadić 2011).

At the Institute of Physics of the Faculty of Natural Sciences of **the University of Kragujevac** there is a one-semester compulsory course, "Astrophysics and Astronomy", for the 5th-year students of physics. The students use equipment (a Carl Zeiss Telescope 150/2250 and a 200/1000 Newton telescope) of the Astronomical Observatory that belongs to the Faculty (Simić 2011).

At the Department of Physics at the Faculty of Natural Sciences (FNS) of **the University of Niš**, an elective course "Introduction to Cosmology" is taught at the 3rd study year of undergraduate studies. At Master studies, a compulsory course "Fundamentals of Astrophysics" (2nd year) for the students of General Physics is taught. The same course is elective for the master students (1st year) of Physics - Informatics. At the PhD level, there are two elective courses: "Cosmic plasma" and "Fundamentals of cosmology". The department has a small 60mm refractor and a MEADE LX200 telescope.

At the Department of Biology, an optional course "Fundamentals of astrophysics with astrobiology" is taught at the first study year of undergraduate studies. At the Department of Geography, an elective course "Astronomy" is offered to the first-year master students. The other courses (Physical and Mathematical Geography) include a number of astronomical topics (Gajić 2011).

At the University of Priština in Kosovska Mitrovica a one-semester 2-hour per week course, "Fundamentals of astronomy and astrophysics", is taught to the second year students of physics.

At the Department of Geography at the FNS in Kosovska Mitrovica, a course "Mathematical geography", which includes some astronomical topics is taught in the first study year (Tadić 2011).

In 2010, a university textbook "Introduction to spectroscopy for astronomers" was published (Prodanović 2010) as well as the second edition of the university textbook "General astrophysics" (Vukićević-Karabin and Atanacković 2010).

#### 4. PUBLIC EDUCATION

Public astronomy education in Serbia was realized mainly through a number of various activities (public observations of astronomical events, courses, conferences, schools and camps) of 20 amateur astronomical societies (Table 2). In the past three years, four amateur societies were founded ("Eureka" in Kruševac, "Bor" in Bor, "Kasiopeia" in Leskovac and "Vlasina" in Vlasotinci), whereas in 2010 the AS "Loznica" ceased to exist.

In January 2010 the Association of astronomical societies and astronomical sections of Vojvodina (AASASV, <http://sadasvoj.org>) was founded by the AS "Lira", AS "Univerzum" and AS "Novi Sad", with the AS "Milutin Milanković" in Zrenjanin and AS "Milutin Milanković" in Pančevo becoming the members as well.

Amateur astronomers association of Serbia (SAAS, [www.saasr.org](http://www.saasr.org)) was founded in February 2010 with the aim to include all astronomical societies in Serbia in popularizing astronomy and related sciences by organizing camps, lectures, observations etc. all over Serbia. Nine registered societies (AS "Univerzum" Bačka Palanka, AS "Orion" Ivanjica, AS "Andromeda" Knjaževac, AS "Alfa" Niš, AS "Novi Pazar" Novi Pazar, AS "Lira" Novi Sad, AS "Novi Sad" Novi Sad, AS "Milutin Milanković" Pančevo and AS "Milutin Milanković" Zrenjanin) founded the Association, while the last registered society in Serbia, AS "Eureka" Kruševac joined the SAAS later as well. However, in March 2010, 6 of 9 societies-founders left the SAAS.

Nevertheless, an intensive collaboration among the astronomical societies in Serbia exists. A nice example was a common project of 13 astronomical societies of Serbia under the title "Serbia takes photos of the Moon", realized from 6 to 15 October 2011.

##### 4. 1. AMATEUR ASTRONOMICAL SOCIETIES

**AS "Rudjer Bošković"** in Belgrade (<http://www.adrb.org>) organized six "Astronomy courses for beginners" (one at each autumn and spring), three Belgrade astronomical weekends (BAW) at the end of June, Summer Schools of Astronomy at the beginning of August (in 2009 and 2010 on the mountain Vidojevica), as well as a

special topical meetings "Summer Astronomical Meetings" held at the end of August/beginning of September.

The Society organized Science fiction courses, held in the period between the autumn and spring Astronomy courses for beginners (December - March).

Table 2. Amateur astronomical societies in Serbia

No.	name	year	town
1	AS "Rudjer Bošković"	1934	Belgrade
2	AG of the "Vladimir Mandić-Manda"	1973	Valjevo
3	AS "Novi Sad" (ADNOS)	1974	Novi Sad
4	AS "Alfa"	1996	Niš
5	AS "Milutin Milanković"	1996	Zrenjanin
6	AS "Lira"	1998	Novi Sad
7	AG within "Gea"	1999	Vršac
8	SRAR "Aurora"	2000	Bor
9	AS "Magellanic Cloud"	2001	Prokuplje
10	AS "Andromeda"	2003	Knjaževac
11	AS "Novi Pazar"	2004	Novi Pazar
12	AS "Tesla"	2004	Belgrade
13	AS "Univerzum"	2006	Bačka Palanka
14	AS "Orion"	2007	Ivanjica
15	AS "Milutin Milanković"	2007	Pančevo
16	AS "Aristarh"	2007	Kragujevac
17	AS "Eureka"	2010	Kruševac
18	AS "Bor"	2011	Bor
19	AS "Kasiopeja"	2011	Leskovac
20	AS "Vlasina"	2011	Vlasotinci

The Society had an important role in several global projects related to the IYA2009. Within the global project "100 hours of astronomy" several lectures and telescope observations were organized in April 2009. About 200 people took part in these activities. In September 2009, the Society took part in the organization of the exhibition on the Serbian-French cooperation in astronomy together with the Department of Astronomy and French Cultural Center in Belgrade. Since 2009 the Society has organized Galileo Teacher Training Program, one of the global IAU projects, lasting 3-4 days, intended to train teachers, the Galileo Ambassadors, in the use of astronomy tools and resources available on the internet in classroom science curricula. About 430 people completed the course.

In the past 3 years about 120000 people interested in astronomy participated in various activities of the Society (Pavičić 2011).

The Society made regular announcements on important astronomical phenomena via radio and TV programs, and newspapers. It participated in several special events (Night of Museums, at national and international conferences, Book Fair, Education Fair "Bell", Festival of Science, International Year of Astronomy etc.). Associates of the AS "Rudjer Bošković" observed various celestial objects and gave many lectures in Belgrade and other Serbian towns.

Astronomical review "Vasiona" (1/2008, 1-2/2009, 3-4/2009, 1-2/2010, 3-4/2010), proceedings of the conferences "Astronomy development among Serbs", V and VI, organized by the Society (in 2008 and 2010) and booklets for the Summer Schools of Astronomy have been published in the past three years.

One of the main goals of the **Astronomical Group of the Organization of Young Researchers "Vladimir Mandić-Manda"** from Valjevo in the past three years was to increase its membership. Through the Winter School of Astronomy, running from January to April every year, new members gain necessary knowledge in astronomy. The lecturers were associates of Petnica Science Center, students of astronomy and related fields, as well as the members of the Group. Attending the School, the new members took part in various activities aimed at popularization of astronomy, and in observations of the Sun, Moon and planets. The observations for public were organized in the center of the city.

By means of two telescopes the Astronomical Group observed all important astronomical events: total lunar eclipse (2008), partial solar eclipse (2008), partial lunar eclipse (2008), observations of Aurorae Borealis (2010), and total lunar eclipse (2011).

The members of the Group organized 5-8 day visual observations of meteor showers: Lirids (2009, 2010, 2011), Leonids (2008, 2010), Quadrantids (2009, 2010), Geminids (2010), Perseids (2008, 2009, 2010), Orionids (2008, 2009). The results of these observations were sent to the International Meteor Organization (Milić 2011).

The Astronomical Group cooperated successfully with other astronomical organizations from our country and from the south-eastern European countries. Astronomers from Valjevo participated at the Letenka camp (2008-2010), Messier marathon (2010) and BAW (2009). For more details see <http://astro-va.tripod.com>.

**AS "Novi Sad" (ADNOS)** has about 200 members. Their planetarium (ZKP-1 of Carl Zeiss, Jena), situated within the Petrovaradin fortress is used for lectures to secondary school students and the general public. In the past three years about 180 groups from primary and secondary schools and about 12000 people visited the Planetarium. Numerous shows and lectures on various topics were organized for high school students and for the university students of astronomy, physics and geography. Many of the students of astronomy in Novi Sad made their first observations as the members of ADNOS. In the last four years, a Thursday evening School of Astronomy (including lectures, projections and observations) was held for visitors. Visitors observed all major astronomical events by means of the telescopes (property of the Observatory). The latest acquired equipment consists of two reflectors (Meade LXD75 6" and LXD75 10"), a Meade DeepSky CCD Imager and a refractor (Skywatcher Apochromat 80/600mm). This equipment is intended for some students' and research projects. Currently, they are in the process of building a spectrograph (Marjanović 2011).

During IYA2009, numerous lectures were held and observations organized. Special attention was paid to the International Astronomical Camp "Letenka", as the AS "Novi Sad" is one of its co-organizers. Much more visitors were present than expected.

The members of ADNOS participated regularly in the Astronomical Camp in Vršac, in the Messier marathon and Letenka Summer Camp, Festival of Science, Night of Museums and Night of Researchers. The Society took part in the popularization of astronomy through local TV and radio programs, newspapers and web portals. The web site of the Society is <http://www.adnos.org>.

**AS "Alfa"** in Niš has more than 150 members, mainly high-school and university students. The Society has a permanent collaboration with the Faculty of Natural Sciences (FNS) and during the past three years it organized dozens of lectures, mainly at the FNS. Public observations of various astronomical events (solar and lunar eclipses, transits of planets, etc.) were performed by means of refractor Vixen, provided as the donation by the city of Niš in 2001, the telescope Meade LX200 (the property of the FNS) and several other telescopes (property of the Society members). The major event was the total lunar eclipse in June 2011 when about 1000 people observed it from the Niš Fortress. Since June 2010, the Niš astronomical meetings have been organized and observations performed at the site Ploče, under Suva planina mountain (30km from Niš, on the way to Bela Palanka). Regular meetings of the Society are held and the members are informed about news ([www.alfa.org.rs](http://www.alfa.org.rs)). The Society has an intensive collaboration with other astronomical societies in Serbia, participating in all major common activities (Letenka Summer Camp or camps organized by Petnica astronomical group). Its members took part in the activities concerning the bolid recorded by the all-sky camera from the Astronomical Station at Vidojevica mountain in November 2010. The Society will continue its efforts to build a small observatory with a planetarium within the fortress of Niš (Sekulić 2011).

**AS "Milutin Milanković"** in Zrenjanin ([www.admm.edu.rs](http://www.admm.edu.rs)) contributed a lot to public astronomy education during the IYA2009 with over 50 articles and participating in numerous radio and TV shows. The members regularly take part in the organization of the international astronomical camp Letenka on Fruška Gora mountain, and with an ever increasing number of participants in the Messier marathon as well. Each year meteor showers of Perseids and Leonids are observed and photographed.

The Society has a fruitful collaboration with the schools and other institutions in the city and many contacts with other astronomical societies in Serbia and in neighboring countries. AS "Milutin Milanković" is one of the founders of the AASASV, which has been very active since 2010 in organizing numerous lectures and exhibitions and in the collaboration with the Amateur astronomers association of Hungary (Penjivrag 2011).

**AS "Lira"** in Novi Sad has continued its regular activities: (1) release of the internet magazine - "Astronomski magazin" (Astronomical Magazine - AM), the largest astronomical web site ([www.astronomija.co.rs](http://www.astronomija.co.rs)) in the country, and possibly in the Balkans as well. Published since 1998, with the contributions by many associates from Serbia and other countries (Croatia, Macedonia, Slovenia, USA, Australia, Italy, Poland etc.), the AM represents an extensive astronomy database. It has over 1000 visitors per day and the forum with 500 members; (2) organization of the observation competition in the Messier marathon (Mm) every year (early in spring) at Letenka. In 2011 it was held in Andrevlje on the Fruška gora mountain, and had an international character (teams were from Slovakia, Hungary and former Yugoslav countries); (3) organization of the international astronomical camps "Letenka" (since 2001), lasting four days in July. The camps include lectures, observation competition, and astronomy related documentaries. About 200 people (mostly secondary school and university students) take part in the camps. The camps are held under the auspices of the Secretariat for science and technological development of Vojvodina and of the FNS of Novi Sad. In the last years the AS "Lira" organized both the Messier

marathon and the Letenka camp together with AS "Univerzum", AS "Novi Sad" and the AASASV.

Apart from these regular activities, the AS "Lira" took part in the common activities of local astronomical societies (lectures and public observations). This year the Society participated in "Zmaj children's games".

The AS "Lira" has an active role in publishing of the printed magazine for popularization of astronomy "Astronomski magazin" (publisher: AS "Univerzum"). Despite rather affirmative official reports, the IYA2009 did not meet the expectations of the amateur astronomical community. Namely, one of the best magazines for popularizing the science in Serbia, "Astronomija", published since 2003 by the AS "Lira" in cooperation with the Graphic studio "Spremo" from Novi Sad, ceased to exist in that very year due to the lack of financial support (Zorkić 2011).

**Astronomical group within the Natural History Society "Gea"**, Vršac, made regular observations by means of a CELESTRON 8 telescope, organized traditional Astronomical Meetings of Vršac (AMV) at the end of every year (the 10th AMV was held in 2010), participated at various meetings organized by other astronomical societies (BAW, Letenka, etc.), published annual bulletins "Gea" with many contributions dedicated to astronomy, followed all important astronomical events and were present in media and in schools.

They participated in the IYA 2009 by publishing the leaflet "My look into Universe" and made a film with the same title, which can be downloaded from the Gea website (<http://www.gea.org.rs>). In 2009 their activities were financially supported by the Fund for an Open Society and the Regional Secretariat for Sport and Youth. In 2011 they were financially supported by Center for promotion of the science and published the leaflet "Discover your view of the Universe" (Lazarević 2011).

**AS "Magelanov oblak"** ("Magellanic Cloud") in Prokuplje, including about 80 members, gather and educate amateur astronomers of the Toplica district. The activities of the Society are also closely connected to the activities at new Astronomical Station on Vidojevica. For more details on the equipment and activities of the Society see the paper by Mijajlović et al. (this volume).

**AS "Andromeda"** in Knjaževac is presently the only astronomical society in eastern Serbia. It has about 350 registered members, but also many other visitors of various events (lectures and observations by means of two telescopes - with 60 mm and 200 mm mirrors). The Society organizes Autumn and Spring Schools of Astronomy on regular basis. More details on the activities of the AS "Andromeda" can be found at the website: <http://www.andromeda.rs>.

**AS "Novi Pazar"** has about 15 members. They made observations by means of a TAL 200K telescope, ETX 60 Meade refractor and a 150mm-Newton reflector.

**"Tesla" Center for Radio Astronomy** in Belgrade has about 15 members. They measured the solar radio flux by means of three receivers, at 406.7 MHz, 1420 MHz and 40kHz.

**AS "Univerzum"** in Bačka Palanka has significantly increased the membership since its foundation in 2006. They initiated the establishment of astronomy clubs in many local schools, and financed the participation of a group of secondary school students at Letenka camp. They organized the exhibition of astrophotographs, first only of the Society members, and later of all astrophotographers in Serbia. It was

shown in several towns of Serbia, and several thousand people visited it. The members of the Society participated in all amateur astronomical meetings (Letenka camps, the BAWs, the Astro-weekends in Vršac and Pančevo, Messier marathon etc.) and had an intensive cooperation with astronomers from former Yugoslav countries, Hungary and Slovakia. As already mentioned above the AS "Univerzum" is one of the founders of the AASASV. Also in collaboration with other astronomical societies they are founders of a new magazine "Astronomski magazin". They purchased some new equipment for the robotized astronomical observatory they succeeded to build during the last three years. All the activities of the Society can be seen on the website: [www.univerzumad.com](http://www.univerzumad.com). It is even possible to have access to some cameras and data bases of the Observatory via the website. During the IYA2009, the president of the Society, Janko Mravik, was the national coordinator of the global project "100 hours of astronomy", which had a great success in Bačka Palanka; several thousand people observed through the telescopes in three days (Mravik 2011).

The main goal of **AS "Orion"** in Ivanjica is the education of the young members of the Society. In the second half of August they organize astronomical camps in Sivčina, near Ivanjica, a site between the Javor and Mučanj mountains. During the last three camps the lectures were given on: astrophotography (2009), the Solar system (2010) and telescopes (2011). The Society has an intensive cooperation with the Amateur astronomers association of Serbia. The organization of an exhibition of astrophotography in the Cultural center of the city is in progress. The AS "Orion" organized the public observations of all major astronomical events in the center of Ivanjica. They possess two 10-inch Dobsonian telescopes, and since this year a home-made 160 mm Newton reflector. The Society plans to perform a reconstruction of its observatory by making the mobile roof (Stojić 2011).

Since its foundation in 2007, **AS "Milutin Milanković" in Pančevo** increased the number of its members to 37. The members regularly participate in Letenka camps, Messier marathons and Summer schools. Since 2010 they have organized astronomical camps in Deliblatska peščara. They have a Dobsonian reflector Sky Watcher (D=305 mm, F=1500 mm). The Society is a member of the AASASV. More about the Society can be found on the website <http://aumm.yolasite.com>.

**AS "Aristarh"**, founded in 2007 in Kragujevac, registered in 2010. They have five active members. The Society possesses a Newtonian reflector with a Dobson mount (250 mm, f/5), a UHC-S Baader filter, a Philips ToU Pro II web camera, a 80 mm triplet APO refractor, a Losmandy GM8 mount and an Orion (UK) photo-Newton 150/600 mm F4 with a coma corrector. Their usual observational site is 55 km from Kragujevac on the slopes of Gledičke planine (850 m of altitude).

**AS "Eureka"** was founded in 2010 in Kruševac (Tomić 2011), and they are very active in promoting astronomy. They have a regularly updated web site <http://www.eureka.org.rs> and the blog "Eureka kutak" (<http://eurekakutak.blogspot.com>). They participated in the Festival of science organized in Kruševac "Days of Eureka", and took an active part in the amateur astronomy section during the XVI NCAS.

**AS "Bor"** (<http://adbor.org>) was founded in April 2011 after many years of astronomical activities of its founders. At the moment the Society has 11 members. They already organized many observations by means of three telescopes and two binoculars in the vicinity of Bor, and the lectures as well. The main goal is to purchase a good telescope for the members of the Society (Agatonović, 2011).

**AS "Kasiopeja"** in Leskovac and **AS "Vlasina"** in Vlasotinci were founded in 2011.

More details about the activities of the above mentioned amateur astronomical societies can be found in the magazines "Vasiona", "Astronomical magazine", "Gea" as well as on the AM website.

Astronomy has also been popularized by the "Mladi fizičar" ("Young Physicist"), a quarterly magazine for the elementary and secondary school students.

#### 4. 2. PETNICA SCIENCE CENTER (PSC)

From October 2008 to October 2011, the Program of Astronomy in PSC realized 21 seminars for secondary school students interested in astronomy and included 150 participants in total. About 30 researchers from the University, Astronomical observatory and other institutes and about 20 students of astronomy took part in their realization (Božić 2011). The two cycles of seminars in astronomy organized by the PSC are described in more detail in Atanacković (2009).

During the past three years forty individual research projects were realized by the participants of the seminars that belong to the most advanced group, of which twenty were presented at the Conferences of the PSC participants "A step into science" (in December) and published in "Petničke sveske" ("Petnica notebooks"). The PSC published two issues of "Petničke sveske" with 16 papers related to astronomy (Beriša and Milošević 2009, Bošović 2010, Dimić and Uzelac 2009, Djordjević 2009, Djordjević and Savić 2009, Gajić 2010, Jovanović and Janićijević 2010, Katić and Mihajlović 2009, Milovanović 2009, Pavlović 2010, Popović 2010, Radojević 2009, Radojević 2010, Velikić and Milutinović 2010, Vojvodić and Marković 2009, Živanović 2010).

The participants and young collaborators of the PSC attended the International Meteor Conferences, as well as the Summer schools of astronomy in Croatia, Germany and Israel. The collaboration with the International Meteor Organization (IMO) is very intensive and each year at least 5 campaigns of observations of meteor showers have been organized by the Petnica meteor group.

The training of the Serbian team for the International Astronomy Olympiads has also been organized at PSC.

The major reconstruction of the PSC, including the building of the new observatory on the hill above the campus, started in July 2011.

More on the activities of the Petnica Science Center (PSC) can be found at the websites <http://www.psc.ac.yu>, [www.ispast.net](http://www.ispast.net), <http://pi.petnica.rs>.

### Acknowledgements

This work has been realized within the Project No. 176004 supported by the Ministry of Education and Science of the Republic of Serbia.

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