

Astronomy and astrophysics in Bosnia and Herzegovina

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Abstract. In Bosnia and Herzegovina astronomy teaching is almost nonexistent. There are only several courses within universities and they are usually given by physicists who themselves have had only elementary courses in astrophysics. When educational outreach is in question, the situation is even more grim. On the other hand, there is a huge interest for astrophysics in the student population. There are several solutions and possibilities which I will present, together with a discussion of the main obstacles which need to be overcome.

Keywords. education, Bosnia and Herzegovina, astronomy, astrophysics

1. Introduction

Around a decade and a half ago Bosnia and Herzegovina (BiH) was an integral part of the larger state, Socialistic Federative Republic of Yugoslavia (SFRY). For decades, development in BiH was determined by its 'big brother' surroundings. In the former SFRY the major centres for astrophysics were Belgrade and Zagreb, and therefore all students interested in astronomy went to those centres for astrophysical education. Those two centres also had astrophysical research institutes and observatories in which scientific work was done.

Thanks to the social support of the former SFRY it was not hard even for the poorest students to go and pursue education they wished for in distant cities. The war and disintegration of the former SFRY left BiH citizens without the possibility of obtaining any astrophysical education in their own country. Besides, economic and various political reasons made it virtually impossible for the average student to go to the former centres to obtain the necessary education. However, Bosnia and Herzegovina was left with two major university centres; one in Sarajevo and the other in Banjaluka.

2. Universities

2.1. *University of Sarajevo*

The University of Sarajevo was established after the Second World War. In December 1949 the first rector was chosen. The university at that time reflected the regional needs for the educated work force and as such there was no great need for astrophysics during that time. There was a department of "mathematics and natural sciences" as the part of the College of Philosophy at that time. During 1960-1969, a separate College for Sciences was established with five departments. Nevertheless, astrophysics remained just another course.

The University of Sarajevo today has a well established Department of Physics which is part of the College for Mathematics and Science. There is no independent part which is doing any research connected with astrophysics. There are only two courses of astrophysics held by the department. The people giving those courses are Yugoslav Strahov (on



Figure 1. The entrance of the Faculty of Mathematics and Natural Sciences, College of Mathematics and Science, University of Sarajevo

a contract basis), and Dr Zalkida Hadžibegović as a lecturer. Unfortunately, searching by ADS for both persons yields zero papers in astronomy and astrophysics related journals. Likewise, direct contact with Dr Hadžibegović did not unveil any research interest in astrophysics.

2.2. *University of Banjaluka*

The university in Banjaluka was established 7 November 1975 following the initiative of the University of Sarajevo and the growing need for an educated work force. The College of Science evolved from a teachers' college established at the beginning of the University of Banjaluka. The Physics Department was established in 1996 as part of the College of Science. Since Banjaluka is in the part of BiH with the majority of Serbian ethnicity, the leaders of the university employed on a contract basis professors from Belgrade and Novi Sad universities as teaching staff for the department. In the department there was only one course in astrophysics. It lasted one semester and it was part of the general physics education.

The University of Banjaluka today has officially two courses. One of them “Astrophysics and theory of the gravitational fields” (one semester) is held by Dr Branko Dragović (contract based, permanently employed in the Institute of Physics, Belgrade, Serbia). Also the ADS a search yielded zero papers for Dr Dragović in the journals related to astronomy and astrophysics.

The only research connected with astrophysics in this department was conducted by myself, during recent times, when I was working for one semester in the department as a teaching assistant on the subject “Introduction of the Theory of the Fields”, although this is not directly related to astrophysics (Andjic (2006)).

2.3. *Other universities*

During the post-war period two more universities appeared. One in the suburbs of Sarajevo and the other in Mostar. Both are new and neither has significant astronomy or astrophysics interests.

+ Information provided with the direct contact with Dr Hadžibegović and Dr Milošević.

2.4. *Mutual cooperation*

Unfortunately, mutual cooperation is divided by the same differences which were a major problem during the war. The ghosts of the war still make it impossible to establish a connection between the two major universities in BiH. A physics society for the whole of



Figure 2. The ‘Banski dvori’, building where the head of the University of Banjaluka with supporting administration is located

Bosnia and Herzegovina does not exist, since current leaders of both universities prefer to pay attention to the past, ignoring the future of the country and science completely. All attempts for contact by personnel of the departments or residents of the different parts of BiH is cut. As an example, my correspondence with Dr Hadžibegović ended without any explanation. Dr Hadžibegović is refusing to reply to my emails.

One of the possible reasons might be that leaders of the universities perceive me as a member of the ‘other/enemy’ side despite the fact that I work abroad. Even an invitation to share the grant was left unanswered. Last year I was contacted by the chairman of a Regional network of IHY, receiving information that I was the only BiH citizen who works within Astrophysics to the best of the chairman’s knowledge. Despite this fact, BiH was included as the member of the regional network, although the members of Bosnian part are, at the moment, myself and six students from Banjaluka University who show some interest in astrophysics.

Again the ghosts of war prevent any interested Bosnian person who perceives myself as a member of the ‘other side’ to contact me about this matter.

3. Observatories and amateur societies

3.1. Sarajevo

The interest in astronomy has always been present in this area. The history of the first and only Bosnian observatory shows it. In the 1960s a society of BiH amateur astronomers



Figure 3. The observatory of Sarajevo, before the war in Bosnia and Herzegovina

founded the Astronomical Society of the University of Sarajevo in 1963 and built the People's Observatory, so called *Mejtas*, with a 17centimetre (7inch) reflector, in 1965. By 1973, amateurs had converted an old AustroHungarian fortress, *Ćolina Kapa*.

The observatory is located at an altitude of 1010 metres on Mount Trebević. In the late 1980s the first serious work started. The observatory started a collaboration with the University of Zagreb on projects including photometry. This continued until the start of the war. Today, the observatory is still in ruins, without any prospect of getting restored. At the moment, it exists primarily for calculations of the sunrise and sunset for the local meteorological institute.

The government of Bosnia and Herzegovina or local universities do not show any interest in restoring the observatory. The situation is reflected on the web as well, where the only detailed presentation of the Sarajevo Observatory can be found on the site made by the Croatian, *Višnjan* observatory.

3.2. *Banjaluka*

In Banjaluka there is an Amateur Astronomical society, but it has only one person with an astronomical education on the board, Mr D. Krunic (bachelor degree, working in the pedagogical institute). They plan to establish a small local observatory, but they are also crippled by the lack of funding and lack of interest by government or local universities. The only activity so far has been organizing various lectures on the subject of astronomy and astrophysics, usually by inviting astrophysicists from Belgrade.

3.3. *Mutual cooperation*

Unfortunately, I could not get any information about the existence of any Amateur Astronomical society in Sarajevo. The one in Banjaluka is registered as the official BiH society and there is the possibility that the same ghosts of war are preventing any cooperation in this case as well. Also the Amateur Astronomical society in Banjaluka did not show any interest in joining the regional network of IHY.

4. The prospective students

4.1. *Banjaluka*

Besides such a poor education and the negligible chance of conducting real research, interest among students at Banjaluka university exists. During my short (one semester) stay at the university, a group of 6 physics students formed a group for intensive astrophysics learning, under my supervision. One of the students, Nemanja Voćkić, had

shown enough interest and readiness for work, to be included in a small part of one of my research projects. Currently we are working on a conference poster and consequently a paper. N. Vočkić plans to include this material into his, obligatory, research work for obtaining a bachelor's degree. Cooperation itself is hard, since students do not receive any support from the university. It is not even clear if Mr Vočkić will be able successfully to defend his work, taking into account that I, as his supervisor, cannot be part of the examination committee.

4.2. *Sarajevo*

According to the information from Dr Hadžibegović and Dr Milošević, the name of the prospective student in Sarajevo is Nedim Mujć, who is currently looking for the possibility of graduate studies abroad. Unfortunately, I was not able to contact this student personally. The reasons for notresponding are unknown.

5. Conclusions

At the moment astronomy and astrophysics do not exist on a professional level in Bosnia and Herzegovina. Not a single Bosnian citizen with a Ph.D. in Astronomy and Astrophysics holds a position at any BiH university or any kind of other institution which is connected with the subject itself.

On the other hand, there is a significant interest among students regarding the subject. The interest is usually pushed aside while most of those students end up studying engineering or similar subjects. Due to the hard economic situation, no student is capable of pursuing undergraduate education within astronomy and astrophysics elsewhere. Also the government and local universities do not provide any help for perspective students in this area, although the need for a work force within this area is evident.

The solution to this problem depends heavily on the political climate and attitudes of the leaders at local universities. At the moment there is no indication that either will change for the better; thus they are providing no support of any kind in the astronomy and astrophysics development of the country. So my recommendation for students interested in the subject is to try and get a scholarship outside BiH and pursue education in astronomy and astrophysics abroad. Hopefully, in time, new leaders of local universities will realize that only persons who perform research can actually teach the appropriate subjects at university level. Hopefully this course of action will help put to rest the ghosts of war.

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l to r: José Ishitsuka, Svetlana Kolomiyets and Nat Gopalsamy