

## Public Astronomical Observatories and Planetariums – Possibilities of Observations, Education and Public Outreach

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### Introduction

One of the primary objectives of the International Heliophysical Year 2007 is:

“Demonstrating the Beauty, Relevance and Significance of



*Fig.1. Solar and Lunar images in the Magura cave near the village of Rabisha, Belogradchik. They are interpreted as part of a calendar frieze depicting the sequence of cult festivals of the ancient society.*

Space and Earth Science to the World and inspire our future explorers”.

Since the beginning of history, man has observed the movements of the Sun, the Moon and the stars. Peoples built sky myths to try to explain some of what they saw, to make order of it, to try to understand these phenomena.

### Public Astronomical Observatories and Planetariums in Bulgaria: aims, organization and basic tasks

Public Astronomical Observatories and Planetariums are specialized extracurriculum pedagogical institutions.

The structure and activity of the specific educational forms there are united in schools, lectures, demonstrations, expeditions etc.

They are aimed towards giving knowledge, skills and creative development as well as motivation of learning and discovery in the field of astronomy, astrophysics and cosmonautics.

There are different type of students in the Public Astronomical Observatories and Planetariums:

1. Students who have chosen natural - mathematical disciplines as their future specializations and profession and are deeply interested in astronomy and physics.
2. Students who objectively need understanding of astronomical scientific content but are oriented to other fields of knowledge and show ambition towards permanent activities with amateur astronomy and gaining modern skills in Amateur Research Observations (ARO).

Students, who do not show interest in astronomical science, are however in close contact with astronomical knowledge mainly by demonstrations, popular lectures, visiting the planetarium and demonstration observations.

The students, amateur - astronomers and citizens showing strong interest in contemporary astronomical and astrophysical achievements participate in all activities of the Public Astronomical Observatories and Planetariums.

The first Public Astronomical Observatory in Bulgaria was founded in 1961 in Stara Zagora. After the visit of Yuri Gagarin - the first cosmonaut in the world - in Stara Zagora, it was named after him.

Nowadays, there are five Public Astronomical Observatories in-Bulgaria, in the towns of Kurdjali, Silistra, Sliven, Haskovo and five Public Astronomical Observatories with Planetariums – in the towns of Varna, Gabrovo, Dimitrovgrad, Smolyan and Yambol. Their activity is coordinated by the Council of the directors of PAO and PAOP in Bulgaria.



*Fig.2. Solar corona during the August 11, 1999 total solar eclipse photographed by the observational teams of Yuri Gagarin Astronomical Observatory, Stara Zagora.*

There is a **three year course on astronomy** in the Public astronomical Observatories. After a course on basic notions in astronomy, students are divided in different groups:

- Stars
- Sun and solar activity
- Solar system
- Rare astronomical phenomena
- Archaeoastronomy,
- Solar-terrestrial connections,
- Solving problems on astronomy.



Fig.3. Partial phase of the August 11, 1999 total solar eclipse photographed by the observational teams of Yuri Gagarin Astronomical Observatory, Stara Zagora.

Students conduct every day sunspot measurements, take photographs, prepare for observing passages and eclipses, every summer participate in archaeoastronomical expeditions.



Fig.4. Transit of Venus across the solar disk on May 8, 2004 – the "black drop" phenomenon during the second contact photographed by the observational teams of Yuri Gagarin Astronomical Observatory, Stara Zagora.

After the annual astronomical Olympiad and the summer school on solving problems on astronomy 5 students from Bulgaria participate in the International Olympiad of Astronomy.

PAOP are involved in the local school science curriculum. At the beginning of every year they organize courses for teachers in different levels of education.

## Instruments for observations of the Sun

### 1. Photospheric observations

- Amateur telescopes – refractors (diameter/focal length in mm): 60/570; 80/800; 80/840; 80/1200; 100/1000, 150/1650; 150/2000; 200/3000;

- Amateur telescopes – reflectors (diameter/focal length in mm): 200/1000; 150/2250 (Meniscas – Cassegrain system) and 150/2250 (Cassegrain system);

- Filters:

Objective filters - SFO63 type and Milar

Eyepiece filters -  $H_{\alpha}$

- Photospheric observations – observations of the Sun projection on a screen, taking photographs with different accessories and astro-cameras, as well as with CCD-camera placed in the main focus of the telescope or in the plane of the eyepiece increase of the image.

2. Observations of the solar limb and prominences – the same instruments as in item 1 and prominence – spectroscope.

3. Observations of the Solar corona during total solar eclipses - the same instruments and filters as in item 1 and:

- long focal objectives (200 ÷ 1200mm) and teleconverter;

- narrow band filters in the IR and UV spectral range.

## Public outreach

Public astronomical Observatories also organize:

Public lectures,

Show programmes – devoted to the week of Astronomy, Sun-Earth day – the spring equinox, International Year of Physics, anniversaries of the PAOP,

Competitions – Participation in International and local initiatives,

Demonstration observations,

Work with children and adults, with the local club of Amateur astronomers.

## Program for the International Heliophysical Year planned for 2007

Public Astronomical Observatories and Planetariums have made a special program for the International Heliophysical Year planned for 2007. It includes:

- Observations;
- Educational activities – What is IHY, IGY innovations and discoveries, IHY themes, organization and working groups;
- Public outreach – presentations, show observations, films, exhibitions, discussions, media.

We work in close collaboration with researchers working in Scientific Institutes and Laboratories. They also give public lectures, write popular articles. Thus, we pass on our knowledge and enthusiasm to teachers and students, support our local schools and teachers; publicize the practical and cultural benefits of our investigations.