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THE IMPORTANCE OF USING SOFTWARE IN CONDUCTING LABORATORY WORK IN THE COURSE OF ASTRONOMY.

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Abstract: The article describes methods of using innovative technologies in conducting laboratory work in the astronomy course. Instructions for conducting virtual laboratory work for the astronomy course are given

Keywords:. Photoelectric photometer, photographic density, communication technologies, multimedia, digital camera, electronic disk.

INTRODUCTION

The use of computer technology in the teaching of natural sciences remains one of the most effective tools for mastering these sciences. Especially in the study of events and processes that cannot directly be demonstrated with the help of experiments (such as micro-events, macro-scale slow events, etc.), modeling of such events and processes is useful in studying their essence.

There are many such phenomena in the course of astronomy, and their organization on the basis of computer technology gives effective results, in particular, it is appropriate to obtain results and observations through computer programs during laboratory work, observations are recommended by the curriculum.

Working with the program will not be complicated, on the contrary, it will be fun. It is useful for demonstrations in the course of the lesson, and also allows you to observe and obtain results even without astronomical calendars.

ANALYSIS OF LITERATURE AND METHODOLOGY

It is very important to apply modern observations and practical innovations of data processing using professional software products in teaching astronomy.

The development of space exploration encouraged the use of digital technology. First of all, Telemetric devices and digital cameras, which were initially developed and used for space observatories, began to be widely used in observatories on Earth. Devices similar to such digital cameras are now widely used in everyday life (digital camera, video camera).

First, before using a digital camera, astronomical observations traditionally involved photographing the luminaries of the sky (photographic plate or film) and measuring the photographic intensity of the image of the luminary (star) in the images. Therefore, the process of monitoring and checking was carried out in two stages. This method has one important advantage: with its help, it is possible to take a picture of the vast surface of the sky from the ground. In such a picture, more than a hundred constellations are captured and the brightness of these stars is measured in laboratory conditions. However, the error of such measurement reaches 10-20%, which is a very large error.

Later, it became possible to measure the light of skylights using photoelectric photometers (electronic optical multipliers). The error of such measurement is 10 times smaller than that of the photographic method, so it is necessary to apply it to each star. To extinguish the rain of one star

it takes several hours and takes many years to measure the brightness of more than a thousand stars. and increases the accuracy (quality) by ten or even a hundred times. In a digital camera, its focal plane, the place where the film is placed, has one side

A chip with 512x512 or 1024x1024 light-sensing semiconductor photodiodes is placed on the square glass surface. A photodiode is a few microns in size, and when light hits it, it gets charged like a capacitor. Using a special charge counter, these charges are counted and recorded on electronic discs.

The rapid development of information and communication technologies will create opportunities related to remote control of telescopes.

The development of multimedia and modern computer technologies, programming from astrophysics made it possible to carry out laboratory work. GLEA (Contemporary Laboratory of Experimental Astrophysics) project can be cited as an example.

At the end of 2010, 16 master's and bachelor's interactive laboratory works were developed in the leading centers and universities of the USA, Europe and other countries. These are the following:

Radio astronomy of pulsars;
Astrometry of asteroids;
Rotation of Jupiter's moons;
The rotation of Mercury according to the Doppler effect;
Photoelectric photometry of water;
Hersshrung-Ressel diagram of groups;
Spectral classification of stars;
Hubble Redshift - Distance Dependence;
Large-scale structure of the universe;

Energy flow of the sun;

Search for X-ray objects;

Based on the GONG project, using images of sunspots to determine the rotation period of the Sun;

Detecting transits of Venus and Mercury using images from the GONG project;

The speed of light. Ryomer's classic experiment;

Extinction of stars and formation of elements;

The height of the mountains of the moon.

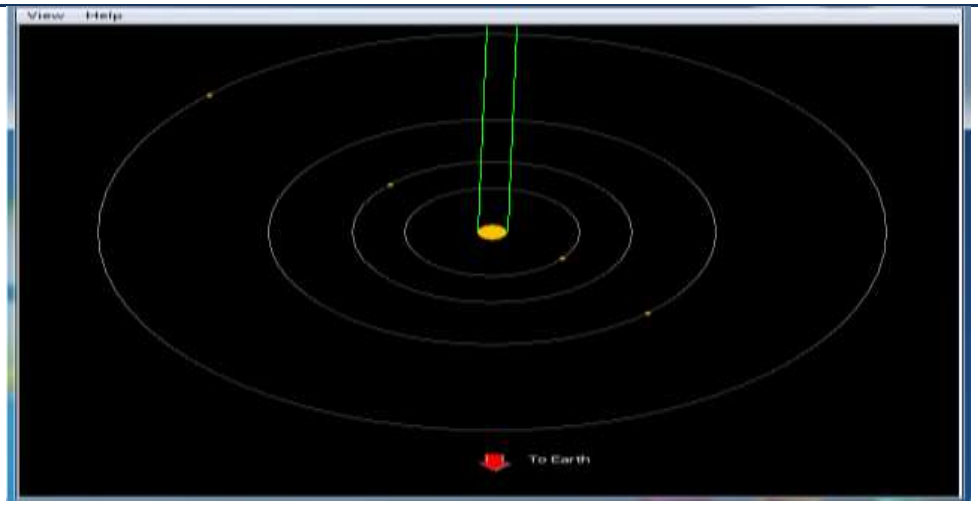
GLEA uses modern automatic optical and radio telescopes, photometers, spectrographs and radiometers, as well as the measurement of animated real astrophysical objects, students learn the skills of processing and analyzing the results of working in modern astronomical mechanics. They will have the opportunity to consolidate their knowledge of astronomy and astrophysics during lectures and independent work.

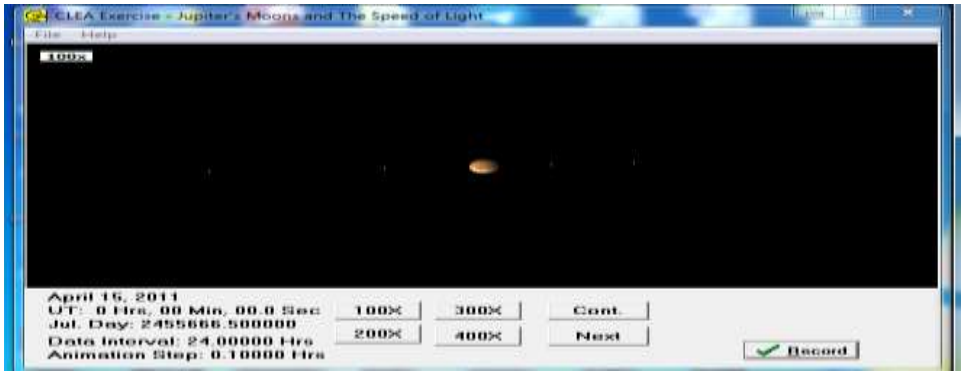
RESULTS

Calculating the orbit of Jupiter's moons. It consists in measuring the coordinates of Jupiter's moons in the images taken at different moments of time and calculating the elements of the orbit of each moon based on the obtained results. This work will be done for Jupiter's brightest moons Io, Europa, Ganymede and Callisto. These satellites are visible in an ordinary school telescope. Based on the obtained results, the position of the satellites in relation to Jupiter can be calculated in advance for the future time, for example, when the evening observation is planned for the time . In such cases, it is calculated in advance it is checked during the observation of the satellite's situation, it is determined to what extent the calculation results correspond to the actual situation of the satellite.

It starts with installing the program on the computer. The case "CLEA JUP" is selected from the program set. The "File" context in the upper left corner of the page is launched and a list of names is entered into the program through "Log In".

Page II of the work from the window called "THE REVOLUTION OF THE MOONS OF JUPITER" i.e. that is to say the rotation of the moons of Jupiter to "File" "Record Measurements" "Run" - "Data" - "Preference" - "Exit" - "Run" - "Start" Date & Time" page is entered. The date of the start of observations on this page (in the left part of the page) in year (month), day (day) and time (in the right part of the page, do not forget that world time is 5 hours behind Tashkent time) hour (hour), minute (minute) and second (second) are entered. The start date and time of monitoring does not have to be the time when the work is done. Go to page III by clicking the "Ok" button at the bottom of the page.





Jupiter and its moons are imaged using a CCD matrix. The CCD matrix has 512 by 512 pixels (photodiodes). The distance of the moon from Jupiter, calculated based on the measured X and Y, is below the place where the values of X and Y are written in the units of the diameter of the planet, for example, written as X= 4.15 E placed. This means that the satellite is located at a distance of 4.15 Jupiter radii to the east (left) of the planet. This record must be entered into the computer's memory, for this we select the "Record Measurements" context in the upper left corner of the page.

When a new page opens, we write the distance found above to the satellite in the empty cells about the names of the satellites. write in the boxes provided for When the measurements are finished, the "Ok" button on the page is confirmed. Now it is necessary to record the measurement results. For this, a new page is opened through "File", "Data", "Save" and the results are recorded and confirmed.

DISCUSSION

Astronomy is one of the rapidly developing sciences today, thanks to many advances in modern information technology and space exploration. In the last 15-20 years, in telescope construction, in the field of manufacturing radiation receivers a big progress has been made. It is a product of technical progress. As a result, astronomical knowledge deepened and expanded. Investigations are ongoing, and

the more we study astronomy, the more new problems arise. All we have to do is revise the astronomy course every year and fill it with news requires.

Astronomical education is a field in need of an information technology-intensive, which has several objective and subjective aspects, such as:

- processes and events that students do not observe in ordinary, everyday life, or even if they do, they occur so slowly and regularly that it is difficult for the student to focus on them and keep his thoughts;

- the possibility of measuring the light of skylights using photoelectric photometers (electronic optical multipliers);

- the rapid development of space research and the use of digital technology in such investigations;

- incorporates the best qualities of digital cameras (informativeness and high accuracy) and increases efficiency and accuracy (quality) by ten or even a hundred times;

- modern astronomical observation and verification works are carried out in the full information technology environment;

- the data collected by today's space telescopes are stored in Internet information banks;

and finally, it is impossible to perform all such astronomical observation-checking works in the conditions of an ordinary educational institution. Therefore, it is better to teach astronomy in the environment of information technology than to teach it in a traditional way.

CONCLUSION

The example given above shows that the use of information technologies in the teaching of astronomy opens up new opportunities. The use of exhibitions and pictures of skylights is important in teaching astronomy. If these pictures and exhibits are prepared with the help of computer technology and the technique of reading them is explained, the effect of teaching astronomy will be extremely strong.

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