

THE EFFECTIVENESS OF COOPERATION WITH RESEARCH INSTITUTES (OBSERVATORIES) IN THE TEACHING OF ASTROPHYSICS

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Abstract. *This article demonstrates the effectiveness of teaching using virtual laboratories in the process of laboratory work on the subject of "Astrophysics" in pedagogical universities, as well as the establishment of close ties with research institutes.*

Keywords. *virtual, laboratory, scientific, pedagogical, institute, efficiency, problem, solution, collaboration, communication*

Аннотация. *В статье показана эффективность обучения с использованием виртуальных лабораторий в процессе лабораторных работ по предмету «Астрофизика» в педагогических вузах, а также налаживание тесных связей с научно-исследовательскими институтами.*

Ключевые слова. *виртуальный, лаборатория, научный, педагогический, институт, эффективность, проблема, решение, сотрудничество, общение*

Annotatsiya. *Ushbu maqolada pedagogika oliy o`quv yurtlarida "Astrofizika" fanida laboratoriya ishlarini bajarish jarayonida virtual laboratoriyalardan foydalanib o`qitish hamda Ilmiy tekshirish institutlari bilan uzviy aloqani yo`lga qo`yishdagi samaradorliklar ko`rsatib o`tilgan.*

Kalit so'zlar. *virtual, laboratoriya, ilmiy, pedagogika, institut, samaradorlik, muammo, yechim, hamkorlik, aloqa*

Currently, one of the priorities in improving the teaching process in the teaching of natural sciences in higher education is the use of new tools of information technology. In particular, the modeling of physical processes in the universe remains one of the priorities in the conduct of laboratory work on the subject of "Astrophysics". The role of interactive computer models in the formation of astronomical knowledge and skills of students of pedagogical universities in the field of "Methods of teaching physics and astronomy" is invaluable. However, there is a problem of lack of interactive computer models to study the astronomy course. In this regard, one of the ways to solve this problem is to develop a methodology for the application and effective use of foreign interactive computer models in the practice of teaching astronomy in pedagogical universities. Of course, in order to produce personnel that meet world standards, it is necessary to establish close ties with scientific research institutes (observatories).

Students of higher educational institutions are required to get acquainted with the laboratory equipment of research institutes and demonstrate them in practice, and in the future to develop skills of complete analysis and synthesis of data from research institutes. Of course, the implementation of this work contradicts the privacy policy of scientific research institutes (observatories). Currently, virtual laboratory work is becoming more popular, for example: <http://astronomy.nmsu.edu/>

1. Fundamentals of measurement and error analysis
1. Observing the sky
2. Cratering and the Moon's surface
3. Cratering and the surface of Mars
4. Determination of parallax measurements and distances
5. Hertzsprung-Russell diagram and stellar evolution
6. Hubble's law and the space distance scale
7. Features of the galaxy
8. Spectral analysis

There is a possibility to carry out laboratory work on astrophysics in laboratories 7-9 of them. But it can serve to build skills, and it can only alleviate the situation.

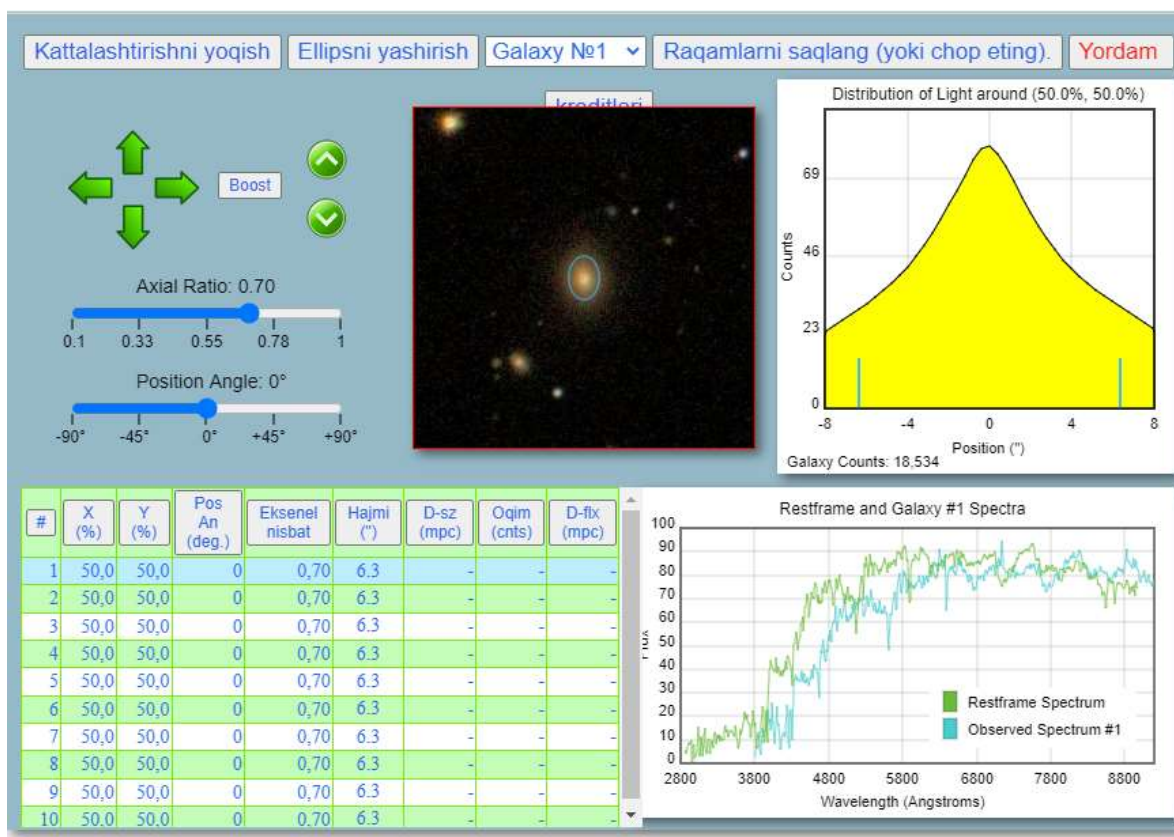


Figure 1. Hubble's law and the space distance scale

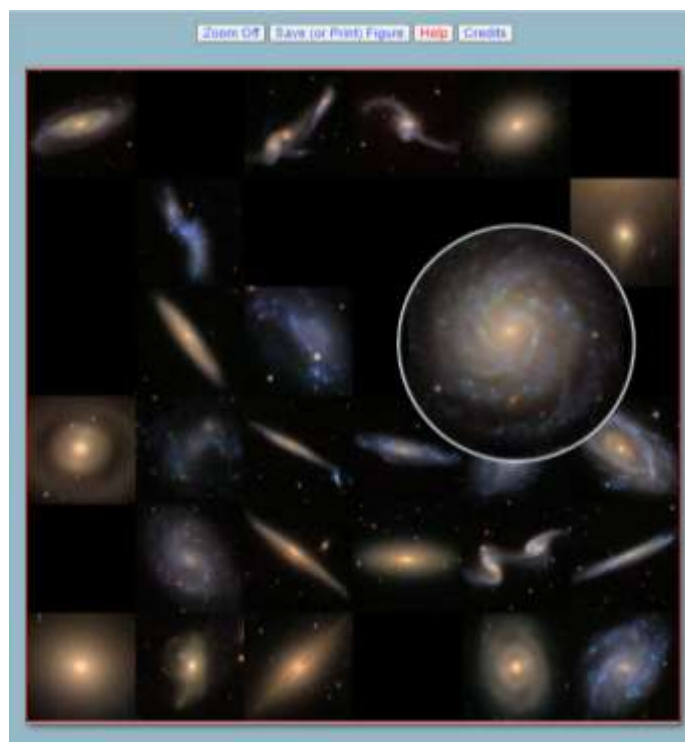


Figure 2. Features of the galaxy

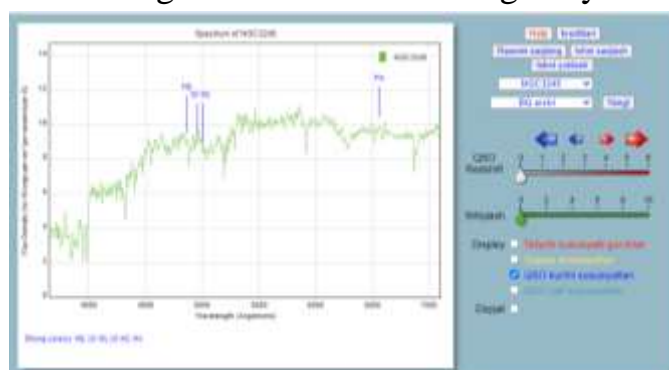


Figure 3. Spectral analysis of stars

It is obvious that in addition to the use of computer models in the educational process, it is necessary to take students on excursions to research institutes (observatories), and this educational process should be included in the curriculum. It is required to determine the number of visits to research institutes (observatories) according to the hours of science.

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