An Introduction to Astronomy and Astrophysics for Urban High School Students

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Abstract This project is designed to introduce astronomy and astrophysics to high school students in large urban centers. It is part of the National Science Foundation's Young Scholars Summer Research Internship Program at The Cooper Union, in New York City.

1. Introduction

Few young people in large urban centers get an opportunity to really see stars, and very few city high schools offer astronomy courses. As a result, not many inner-city youngsters become attracted to the discipline. My goal, through daily lectures, texts, slides, films, and laboratory exercises, is to give students an accelerated introduction to astronomy and astrophysics in understandable terms, with the hope of stimulating them to further study. Topics for study include coordinate systems; positions and motions of celestial objects; the solar system; distance measurements; stellar masses, luminosities, color, and motion; spectral classification; main sequence and unusual stars; variable stars; galaxies; cosmology; photometry; and telescopes.

2. Program

Students have access to, and are encouraged to use, the Cooper Union and NYU Library Consortium, and the Public Library System. Many astronomy, physics, math, optics, and electronic texts, journals, and scientific magazines are readily available in the classroom, along with several computers loaded with interactive astronomy software. In addition, the full computing facility of the institution is available to the students. Highlights of the program are the observing sessions, doing "remote astronomy" through the Telescopes In Education (TIE) program (Duff, these proceedings). Using the 24-inch telescope and CCD camera on Mount Wilson, the students are able to locate and capture the images of previously-selected objects, and download them to their computers for later analysis and image enhancement. All students, individually or with a partner, are required to research a topic or complete a project. Their results are presented orally, and in a written final report.

3. Conclusion

Determining the success of a program such as this can be difficult. The project is an accelerated version of the two- or three-semester electives for Cooper Union science and engineering students, many of whom have been influenced to pursue advanced degrees in astronomy and related fields. At this time, approximately 8% of the high school students who have been enrolled in the project are in college programs, planning careers in astronomy or other space-related fields.

4. Acknowledgements

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