

## Project Summary

### Intellectual Merit:

**Broader Impact:** This proposal resonates with the National Science Foundation’s broader impacts criteria on many levels. First, the proposal helps promotes teaching and learning by promoting modeling approach to teaching HS physics, integrating problem-based learning into general physics, and the introduction an astronomy concentrations within the physics major to increase the number of majors. Nationally, astronomy traditionally draws a higher fraction of women than physics, so the introduction of the astronomy concentration should attract more female students, a group that is significantly under-represented in physics. Second, the project provides hands-on training and learning for tens of undergraduate students through research. The Siena undergraduate students will be encouraged to become involved in all aspects of research, including data acquisition at world-class observatories, on-campus data reduction and analysis, and presentation of results at national conferences and through publication in peer-reviewed journals. The computer analysis, data interpretation, and presentation skills the undergraduates learn will be essential for success in the workplace, the classroom, or graduate education in any field of science. Finally, the proposal enhances the infrastructure for research and education at Siena College by formalizing collaborations with the ALFALFA team, several of whom are located in New York State and already serve as an extended network of mentors for Siena undergraduates. The proposal will also enable Siena to conduct remote observing sessions at Arecibo.

**Broad Dissemination of Results:** The scientific results of will be disseminated broadly through publication in peer-reviewed journals, online database, presentation at regional, national and international meetings. I will provide a full catalog for the scientific community that will include an extensive array of primary and derived data products. This will be a much-needed reference for galaxy evolution modelers, particularly those who model the evolution of galaxies. The pedagogic results will also be disseminated broadly through publication in peer-reviewed journals and presentations at regional and national conferences. Of particular interest is the impact that problem-based learning has on student retention and research readiness. In addition, we will develop a new assessment tool that measures a student’s ability to think independently and solve real-world problems. This will be of wide interest to institutions looking to implement similar research-focused curricular changes.