Robotic Telescopes in the Classroom

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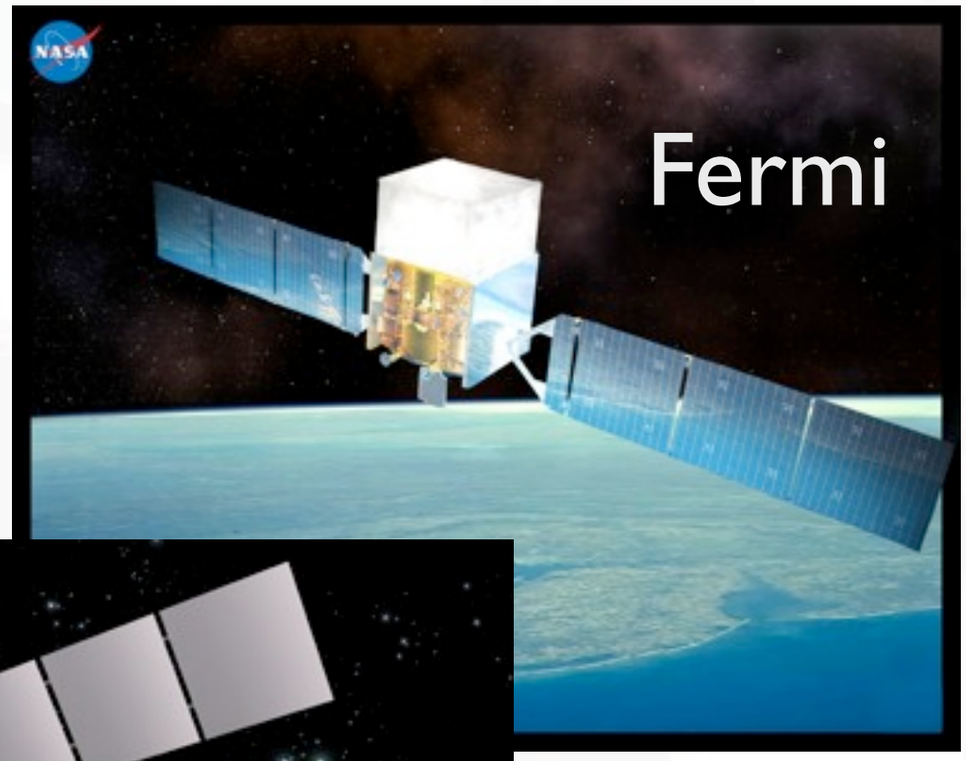
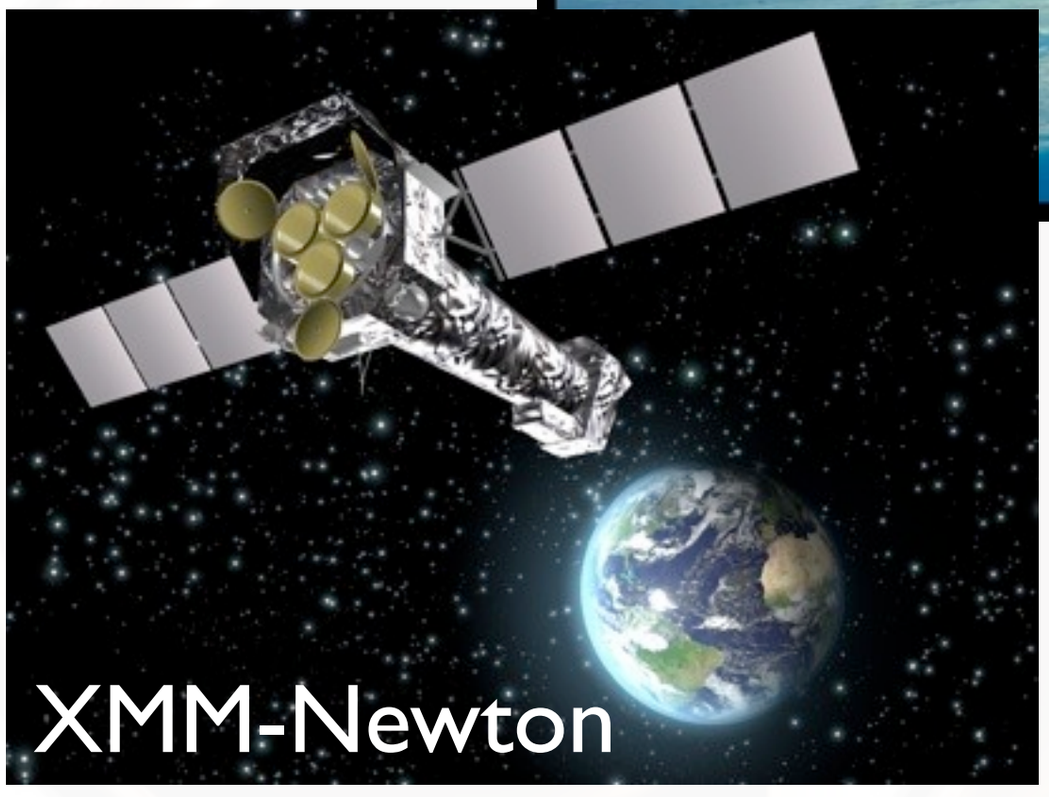
Telescopes From Afar, Waikaloa, HI, March 2011

GTN Project





Supported by NASA High Energy Missions

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Global Telescope Network

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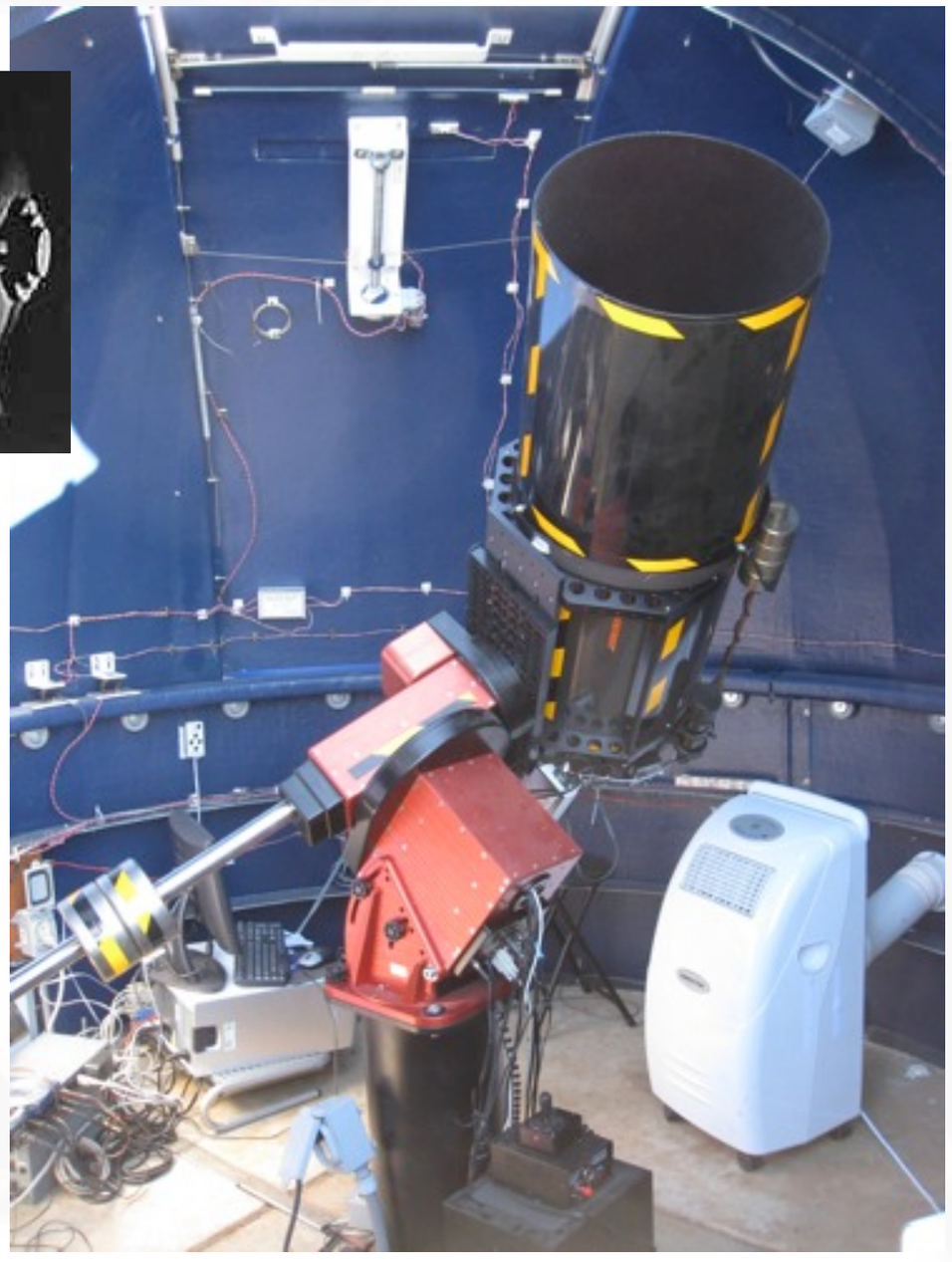
GORT

(GLAST Optical Robotic Telescope)



- C 14 telescope
- Apogee 1024x1024 CCD
- Remotely Operated via Internet
- Can be run by central server: SkyNet (UNC/PROMPT)

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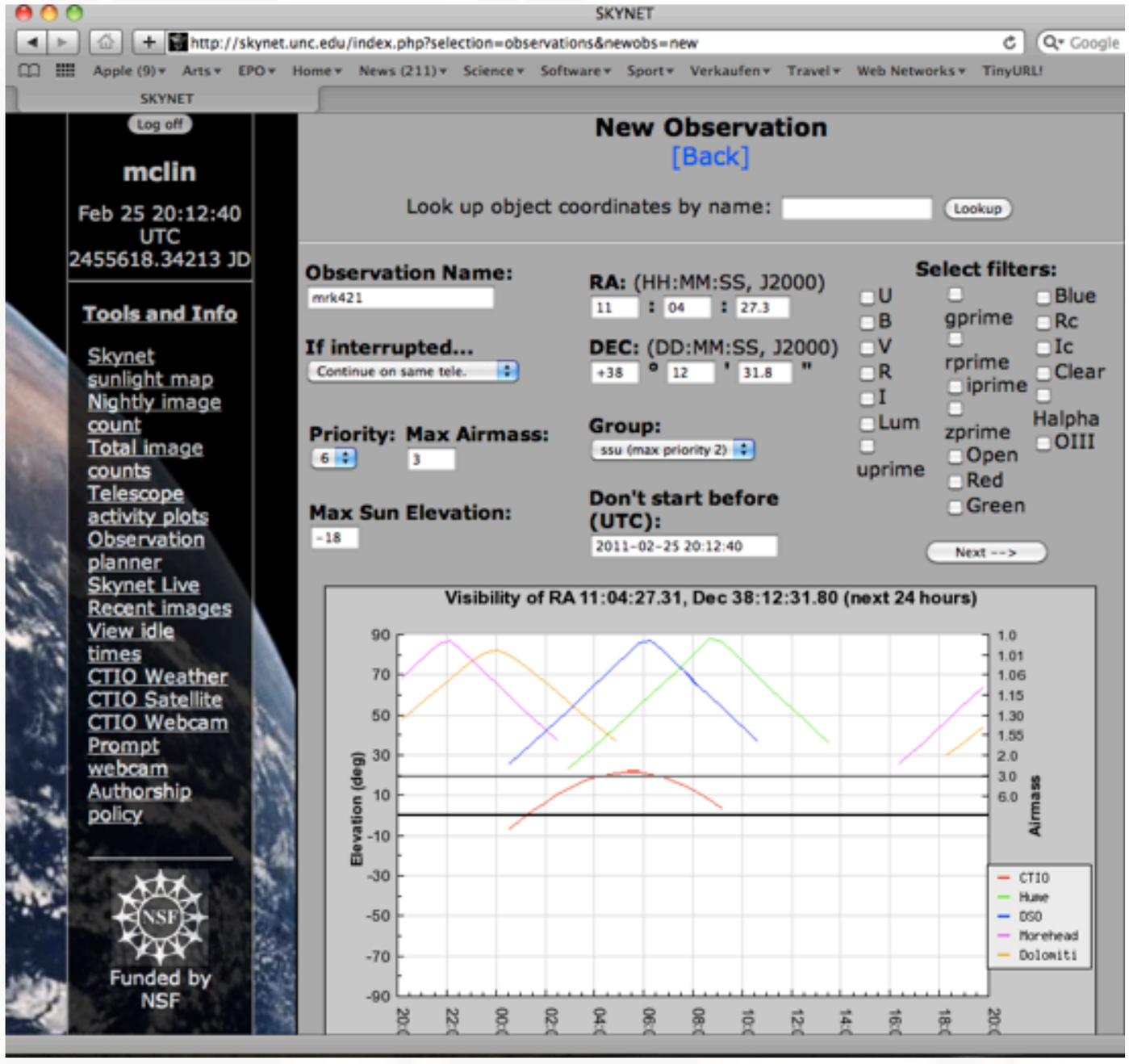
Skynet Observing Queue

Standard way to observe is through the Skynet web interface.

Maintained by PROMPT group at UNC (D. Reichart, PI).



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Who Uses GORT?

College Students...

Observing classes

Individual Research Projects

ASTRO 101 Courses

Summer Internships and Other Employment (generally not remotely)

Regular users include SSU, Chicago State, Portland State

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Who Uses GORT?

High School Students... In class

Norridge, Ill

Astronomy Course - Variable stars

Antioch, CA

Astronomy Course - Variable stars, AGN, asteroids, track moons of Jupiter, observing notebook, stellar evolution image catalog

Most projects are photometry-based, with some astrometry as well.

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Who Uses GORT?

High School Students...
Summer Interns

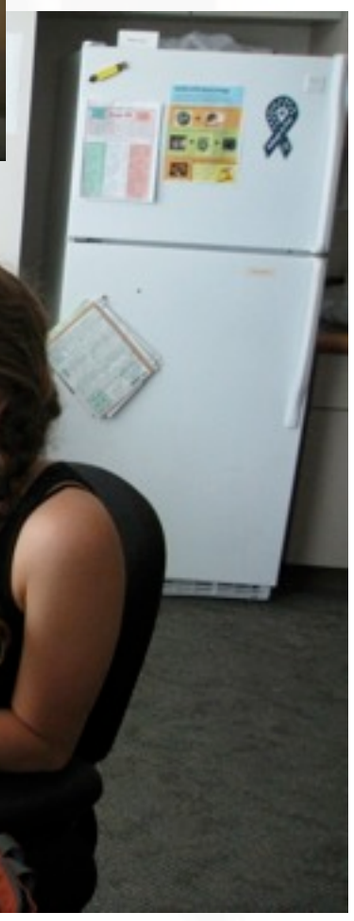
Part of an SSU/Sonoma County Office of Education program for Sonoma County High School students.

NASA E/PO sponsors two students each summer.

Have done AGN monitoring for the past two summers.

Students present results at a symposium held in September.

See our poster on this program (No. 27)



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Who Uses GORT?

High School Teachers...
Professional Development

NOAO - Image processing workshops, multi-color imaging.

SSU - EA Training, testing of new products.

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In addition to these users, we have others who connect via Skynet, but we don't keep track of them or their projects.

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Barriers to Use

- Science Standards/Testing
  - Astronomy is not tested, so is not taught.
- Teacher Preparation
  - Teachers are unfamiliar with astronomy concepts and data reduction procedures.
  - They often don't have extra time to learn this material.
- Lack of computers and software
  - Commercial products are expensive
  - Free software is difficult to use
  - Internet access can be a problem

We are working on a pipeline to make data reduction easier for high school students and teachers.

Summary

- Robotic Telescopes have given unprecedented opportunities for students in high schools and small colleges to obtain their own astronomical images.
- This has allowed for dramatic changes in the way science (astronomy) can be taught at the undergraduate and secondary levels. Sadly, this potential is not being widely realized.
- Lack of resources (at the secondary level) have so far stymied the potential of remote telescopes in high school classrooms,.
  - A lack of computer hardware and software means students cannot work with images.
  - Teachers typically lack expertise in data processing, and they lack the time to gain this expertise. Furthermore, there are often disincentives for them to do so. [How can we change this?]
- Things are better at the college level, where these previous two points are much less applicable... But perhaps inertia can be a problem.

Last Word

"Your willingness...to let my Astronomy students use a real research telescope for two observations was a key element for transforming the class from a straight lecture format to a student-centered, lab-focused experience. The majority of the students I teach are math-phobic but excited to learn about the cosmos."

-Jack C. Straton
Associate Professor of Physics
Portland State University

More information:

http://gtn.sonoma.edu