Remotely Controlled Telescopes
A New Look at the Cosmos for Educators

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www.astro.louisville.edu and www.sharedskies.org

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Overview

Astronomers have a tradition of making their discoveries accessible to everyone.

With the latest in technology, the world's largest and smallest telescopes are being made available to anyone with a computer. Some of them will image the entire sky weekly, enabling us to discover and follow asteroids, exoplanets, and supernovae. Others are delivering views that rival Hubble's images from space. We will look at how these resources are used for research, education and public astronomy, and the opportunities offered by the Shared Skies Partnership.

Tycho Brahe's (1546-1601) Uraniborg

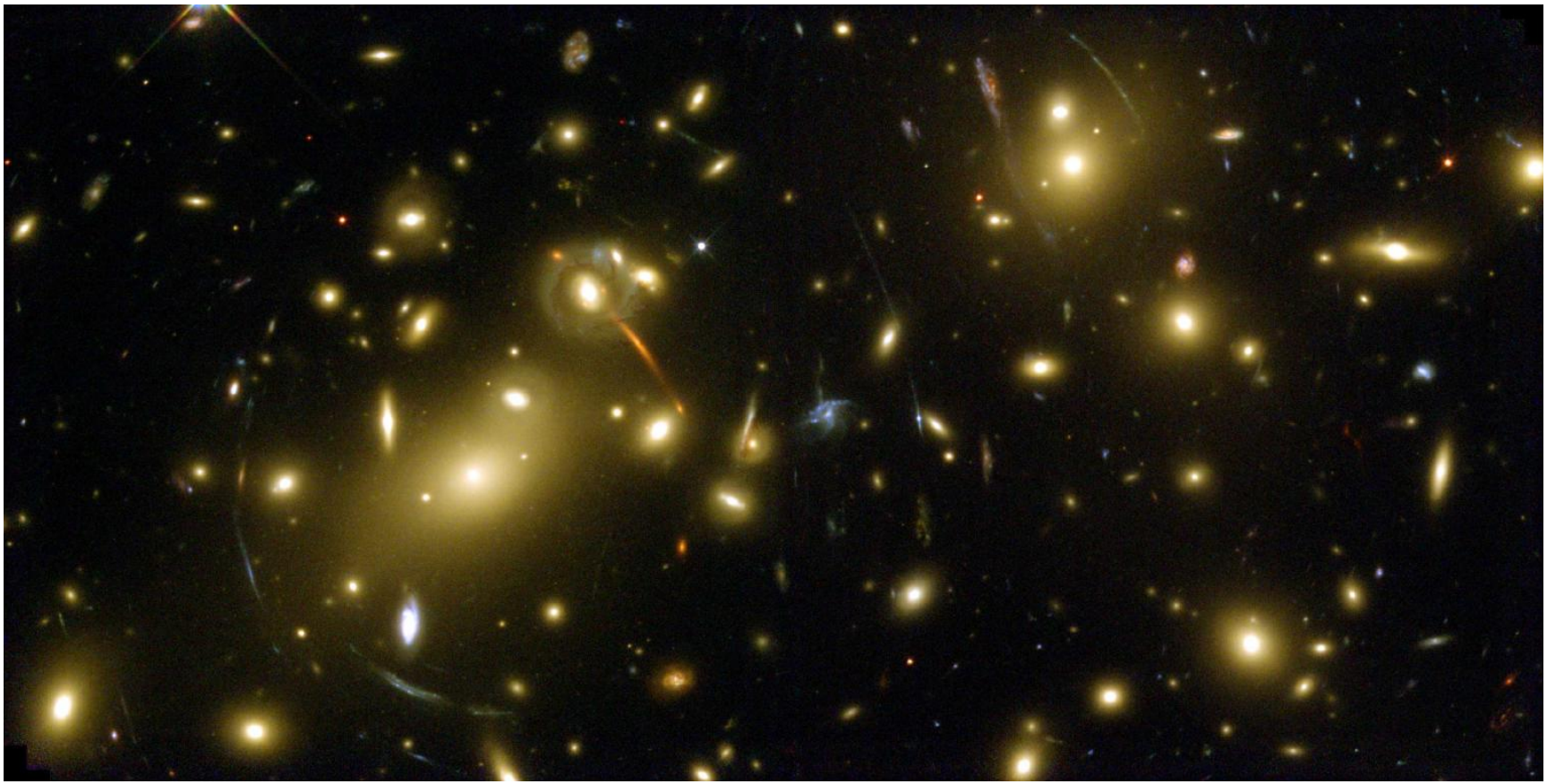
Henrich Hansen (1882) – Det Nationalhistoriske Museum pa Frederiksborg

William Herschel's (1738-1822) 40-Foot

H. Kielkopf

Come my Lord Bishop. I will show you the way to Heaven
King George III, 1787

Hubble in Space

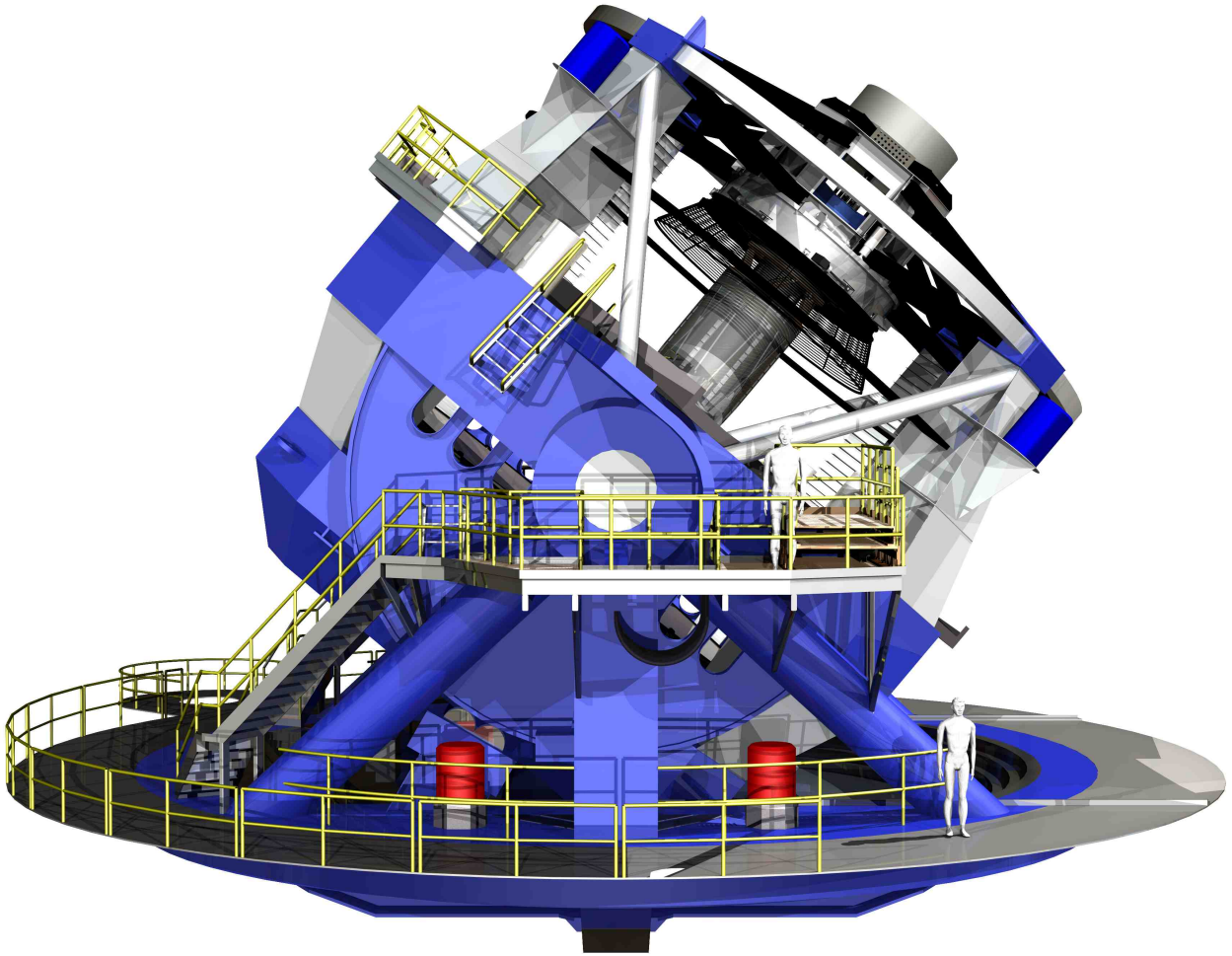


NASA

New Telescopes on the Ground

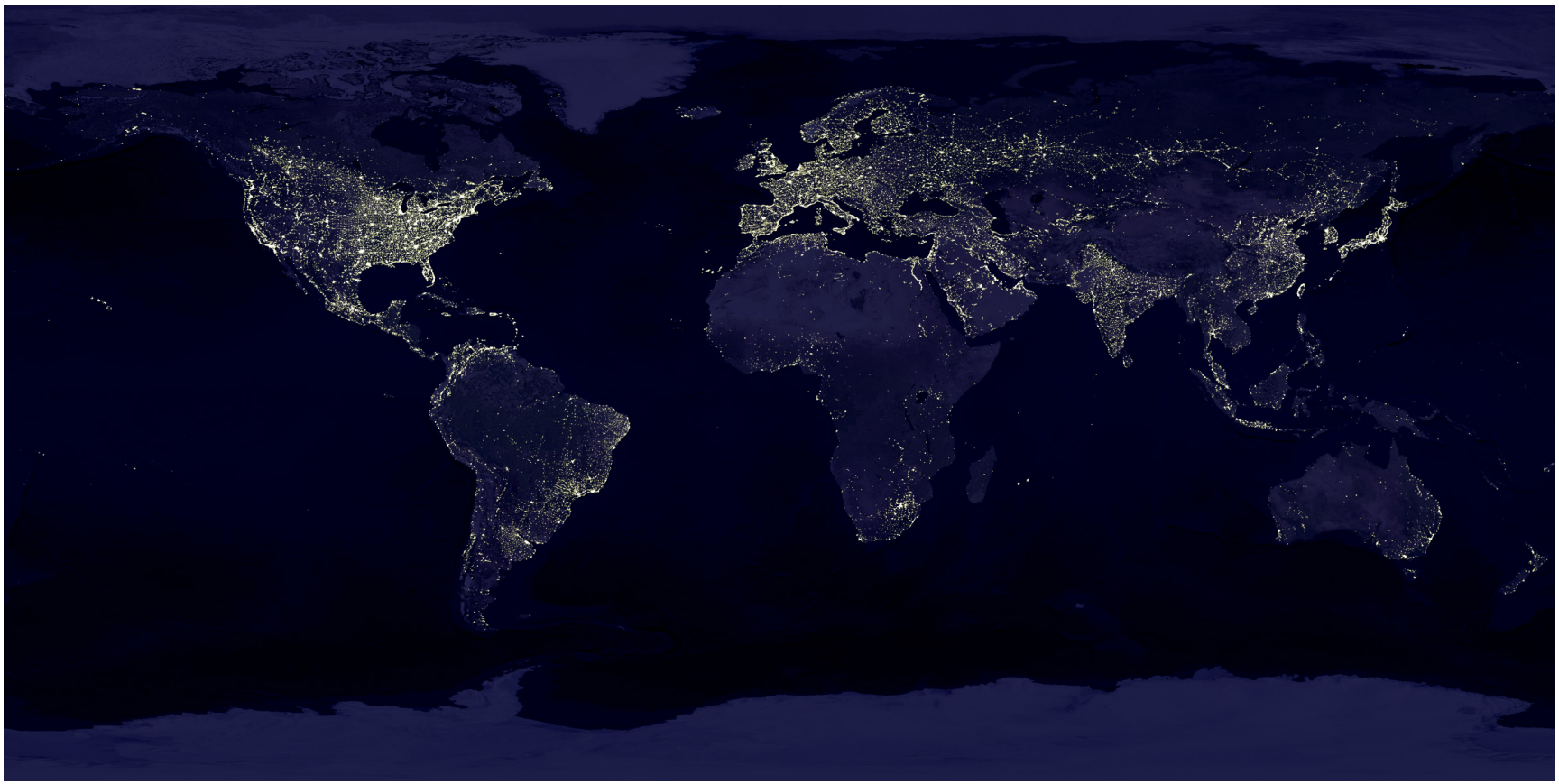
- LSST $390M – 8.4-meter single mirror – 2018
  - Public-private U.S. partnership, Cerro Pachón, Chilé
  - Study dark energy and search for near-Earth objects
  - Covers the entire sky every week
- Shared Skies $1M – 0.3, 0.5 and 0.7-meter – 2010
  - Universities of Louisville and Southern Queensland, Australia
  - Remote access for education and exoplanet research

Large Synoptic Survey Telescope



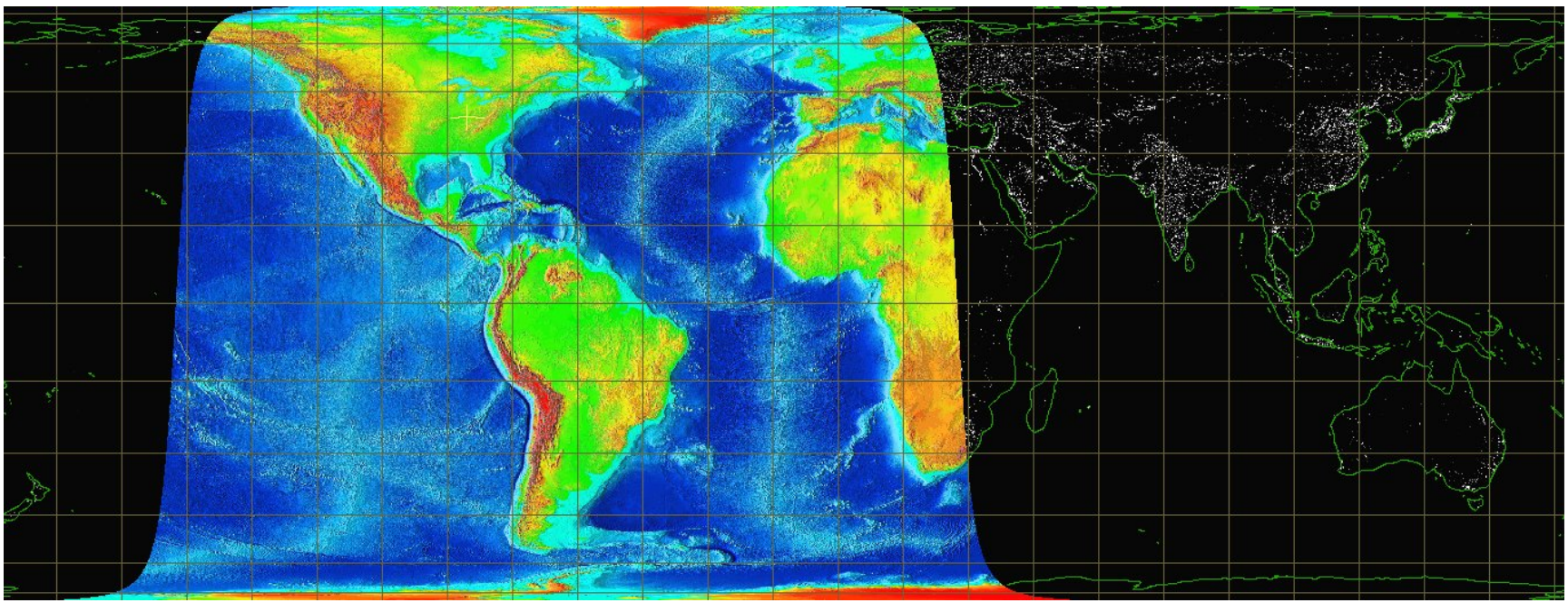
LSST

The Earth at Night



NASA

The Earth at Noon



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U of L's Campus

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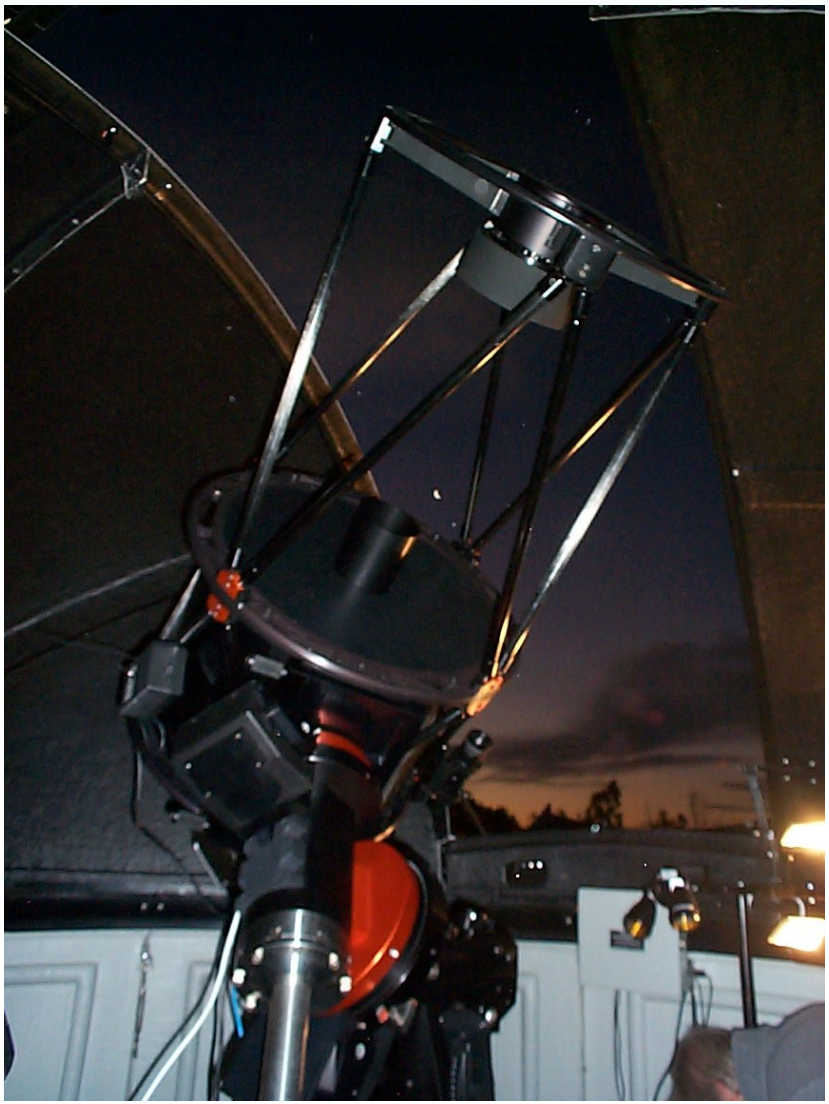
Mt. Kent Observatory's C20 Dome and Dr. Brad Carter

J. Kielkopf

Telescope Operator (Trainee)

J. Kielkopf

Mt. Kent 0.5-m Corrected Dall-Kirkam



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Live On-Line Telescope

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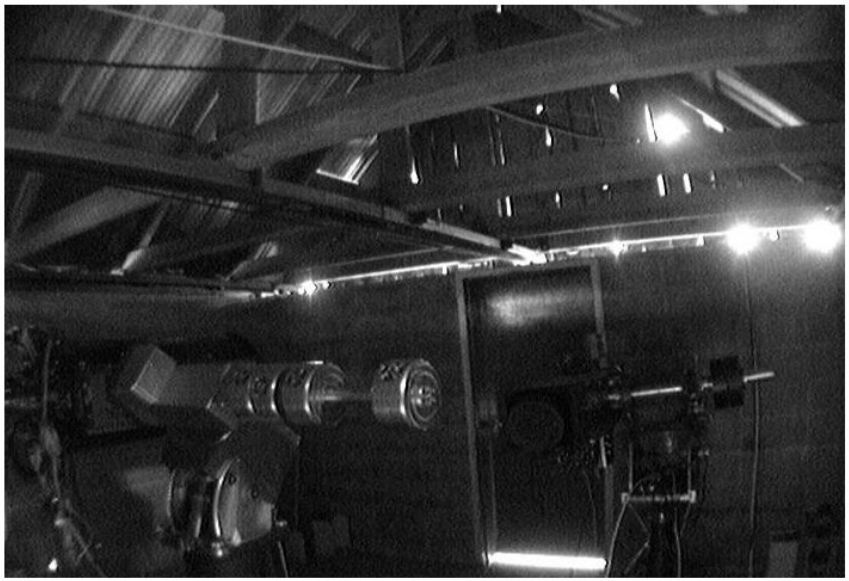
Web Interface



Northern Sky Live Telescope

View Telescope	View Night Sky	View Field	View Last Image	Explore Archive
Expose	Color Camera	Instruments	Power	Help
Step North	Step South	Step East	Step West	1° Set
Set Target	RA 0 h 0 m 0 s		Dec + 0 ° 0 ' 0 "	
Slew Target	Show Current	Sky-Map	Clouds	Weather

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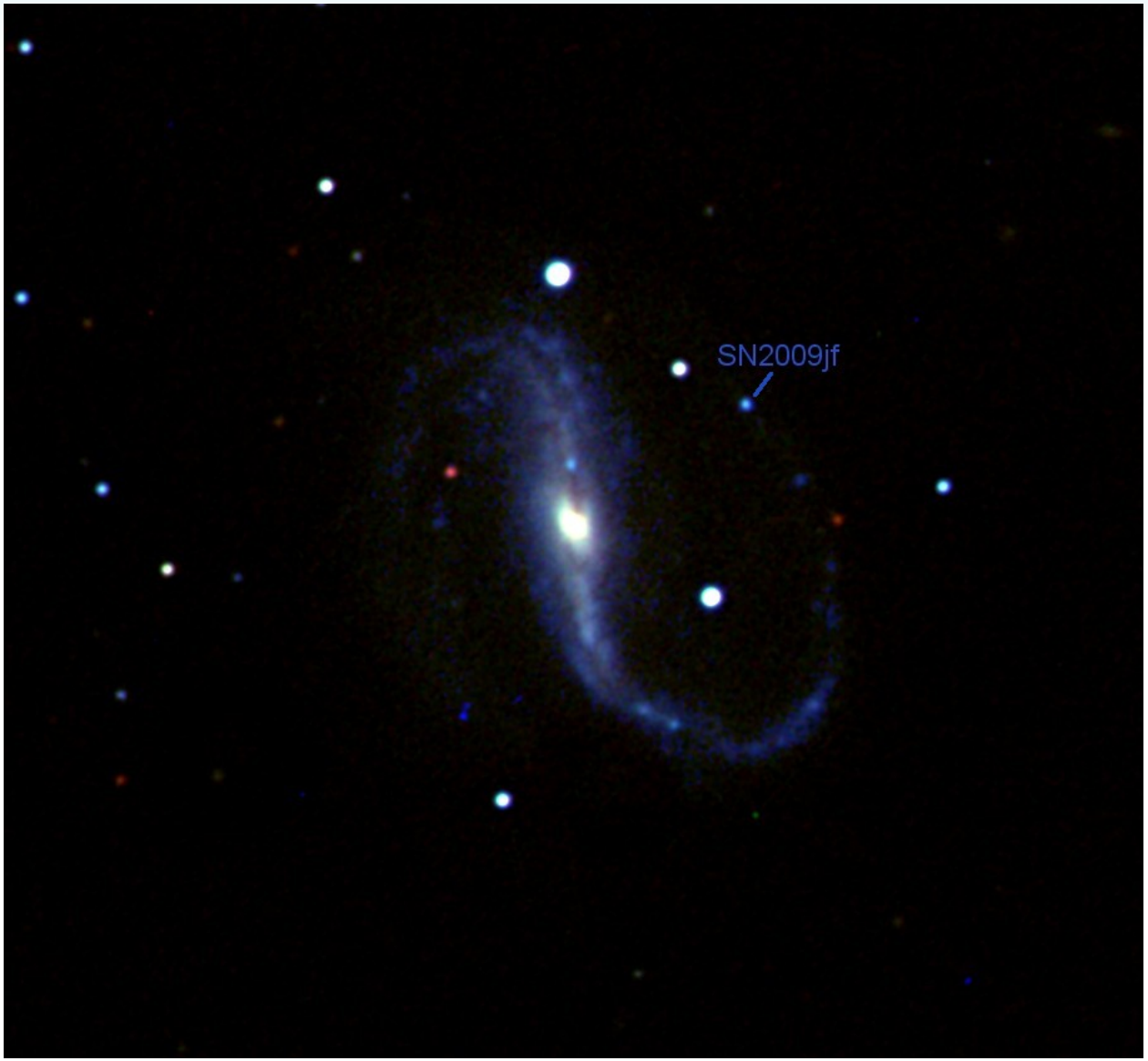
CDK700 Under Construction

B. Carter

CDK700 First Light

K. Collins

NGC 7479 with SN2009jf



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The Dumbbell Nebula - M27

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Proxima Centauri 2007

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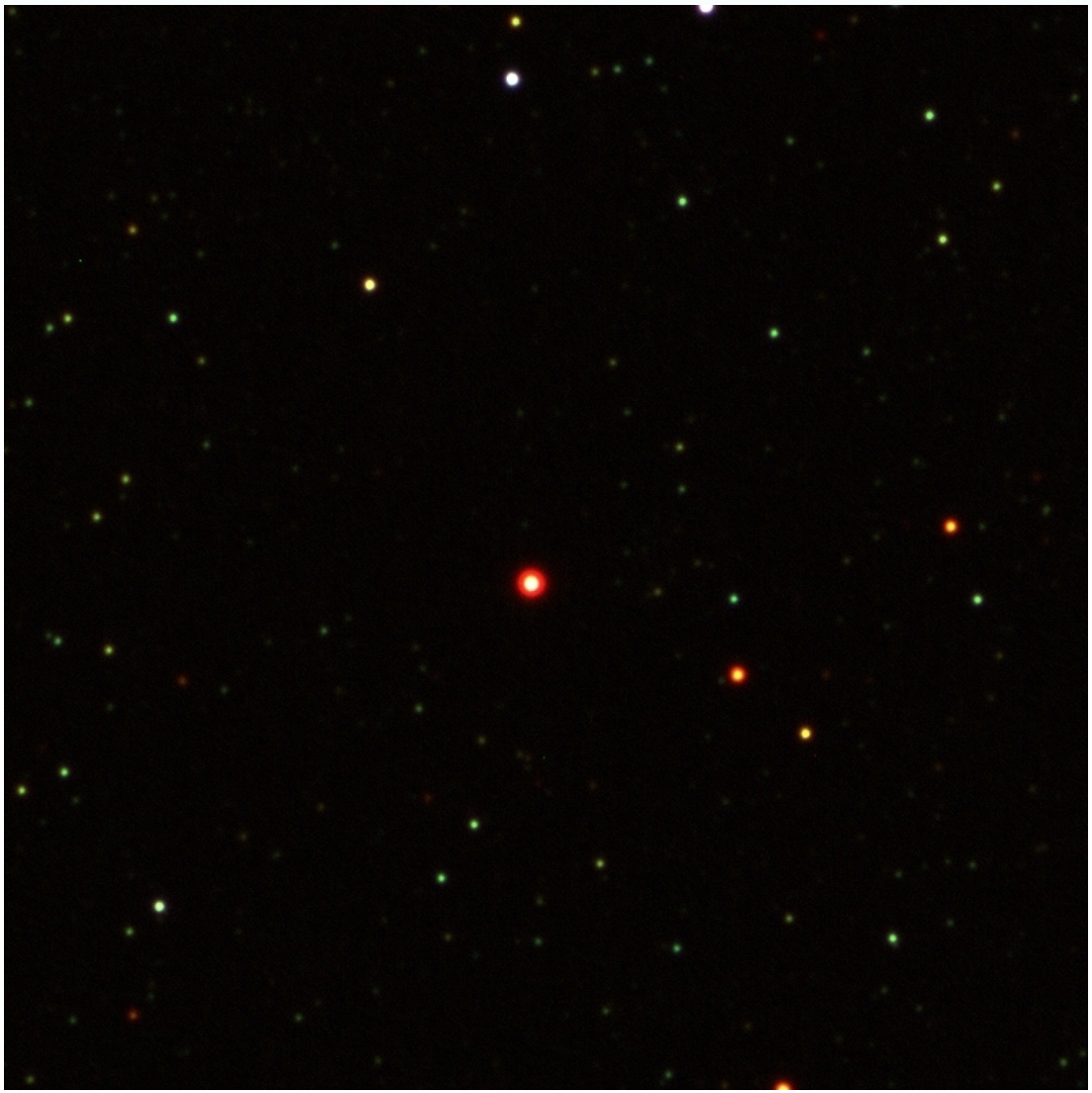
Proxima Centauri 2009



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Moon's Phases and Craters

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Jupiter - October 17, 2010 - 1:27 AM

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Jupiter - October 17, 2010 - 2:37 AM

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Uranus's Satellites

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Astronomy and Understanding

Astronomy is an "observational" science. We cannot do experiments in the usual sense, since our data are constrained by our location in time and space.

Yet, astrophysics depends on the fundamental underpinning physics, and it guides our understanding of everything, even outside science.

Consider, with Carl Sagan, the Earth from space –

... that's here, that's home, that's us.

Earth from Space

NASA

This distant image of our tiny world underscores our responsibilities to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we've ever known. – Carl Sagan

Shared Skies for Education

- Teachers experience science first hand
- Students explore and learn by discovery
- Everyone can follow their curiosity
  - Science as a human endeavor
  - Scaffolded approach
  - Guided access to real data

Shared Skies through U of L

- Department of Physics and Astronomy
  - Astronomers
  - Remotely operated quality instruments
  - On-line access to recent data
- College of Education and Human Development
  - Content for curriculum
  - Planetarium workshops for teachers
  - Campus visits for classes

Shared Skies through USQ

- A night sky during our daytime
- Southern sky and the center of the Milky Way
- Team with teachers and classes in Australia
- Support for distance education
- Content for the International Baccalaureate

Scaffolded Content for the Classroom

- Our solar system
  - Moon – phases, craters, orbit
  - Jupiter, Saturn, and Uranus – satellites, mass, and orbit
  - New comets and nearby asteroids
- Stars and the Milky Way
  - Measure star colors and brightness to find their size and evolution
  - Explore clusters of stars
  - Observe unstable and pulsating stars
  - Find hydrogen and other elements in stars and nebulae
- Other galaxies
  - Large and Small Magellanic Clouds
  - Andromeda Galaxy and the Virgo Cluster of Galaxies
  - Supernovae

Shared Skies for Research

- Instrument development
- Young suns and variable stars
- Exoplanets
- Transient events –
  - Novae and supernovae
  - Comets
  - Asteroids

Credits

- Brad Carter, Rhodes Hart, and Kay Lembo USQ
- Karen Collins, U of L Physics and Astronomy
- Bo Lowrey, Jefferson County Public Schools
- Rick Hedick and Joe Haberman, Planewave Instruments
- NASA and Kentucky Space Grant
- Ron Moore, U of L Information Technology (retired)
- Charles Hawkins, Northern Kentucky University

www.astro.louisville.edu www.sharedskies.org