

# Everything YOU wanted to know about Teaching High School Astronomy



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*This presentation is supported by McDonald Observatory  
the University of Texas at Austin.*

# Limited Lab Space?



- **Most astronomy labs don't need:**
  - Water
  - Chemistry hoods
  - Extensive use of computers
- **Most astronomy labs do need:**
  - Table space
  - Normal access to electrical outlets
  - Occasional: a way to darken the room
  - Projection system (for those wonderful visuals)

# Equipment



- You may already have some equipment for astronomy in your physics or chemistry supplies
  - Lenses
  - Mirrors
  - Rulers/meter sticks
  - Gas emission tubes/diffraction gratings

# Equipment



- **New supplies**
  - Polystyrene spheres (for phases)
  - Solar motion demonstrators (for seasons)
  - Celestial sphere with horizon ring (one for demonstration)
- **Very few consumables are needed, and are often common supplies**
  - Play-doh
  - Foam-core boards
  - String
  - Elastic/safety pins

# Do I need a telescope?



- Probably, yes. But, you don't need one for each student.
- Dr. Hemenway's recommendation:
  - One larger telescope for special star parties
    - ✦ Estimated cost for 8-inch "go-to" scope = \$1500
    - ✦ Estimated cost for 8-inch Dobsonian = \$300-400
    - ✦ Estimated cost for 4-inch Astroscan = \$200
  - Several smaller telescopes and/or binoculars
    - ✦ Galileoscope = \$25 (if you purchase six or more)
    - ✦ Binoculars = \$35
    - ✦ Tripod = \$22

## But, I can't meet at night



- At least once a semester – try for a star-party at night (perhaps after a school open house or parent meeting). Invite a local astronomy club to bring telescopes and use yours.
- Use your telescopes during the day to view:
  - Sun (with appropriate safety cautions) or specialized telescope
  - Moon
  - Venus
- Option: Use a remote telescope

# OK, I want one. How do I choose a telescope?



- Picking a telescope is like picking out a new car. Consider your potential needs and price range.
- Hints are at:

<http://stardate.org/nightsky/bgguide/view>

Aperture (diameter of lens or mirror) determines light-gathering power

- Eyepieces determine magnification (get at least two)
- Use electricity or not.
- Where will you store it and how heavy is it to move?

# Remote Telescopes



- **Advantages:**

- Often larger aperture
- Often backed by professional staff
- Some daytime access
- Some “observations by order”
- Can involve students in real research
- Processes images that are a permanent record

- **Disadvantages:**

- Require good computer access
- Require more training for operation
- Require computers to process the data (images)



# A sample HS course scope and anchors

## Kelley Janes

### • Quarter 1

- Scale of the universe
  - ✦ **SCALE MODELS**
- Motions of the sky
  - ✦ **MODELING THE NIGHT SKY**
  - ✦ **EQUATORIAL SUNDIALS**
- Comparative solar system project
- Earth moon system

### • Quarter 2

- Ancient astronomy through 1609
- Roots of astronomy project
- Copernicus, Brahe, Kepler, Galileo
  - ✦ **ELLIPTICAL ORBITS**
- The telescope

### • Quarter 3

- Interpreting light
- Electromagnetic spectrum
  - ✦ **MULTIWAVELENGTH ACTIVITY**
- Stellar evolution
  - ✦ **LIVES OF STARS**
- Observation Project

### • Quarter 4

- Galaxies
  - ✦ **STARS AND GALAXIES**
- Cosmology
  - ✦ **THE EVIDENCE IS CLEAR**
- Student choice poster project

# Website

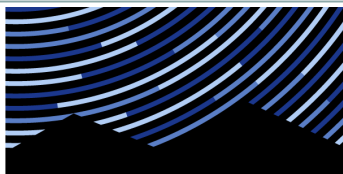


<http://outreach.as.utexas.edu/marykay/highschool/hs.html>

# Other Resources



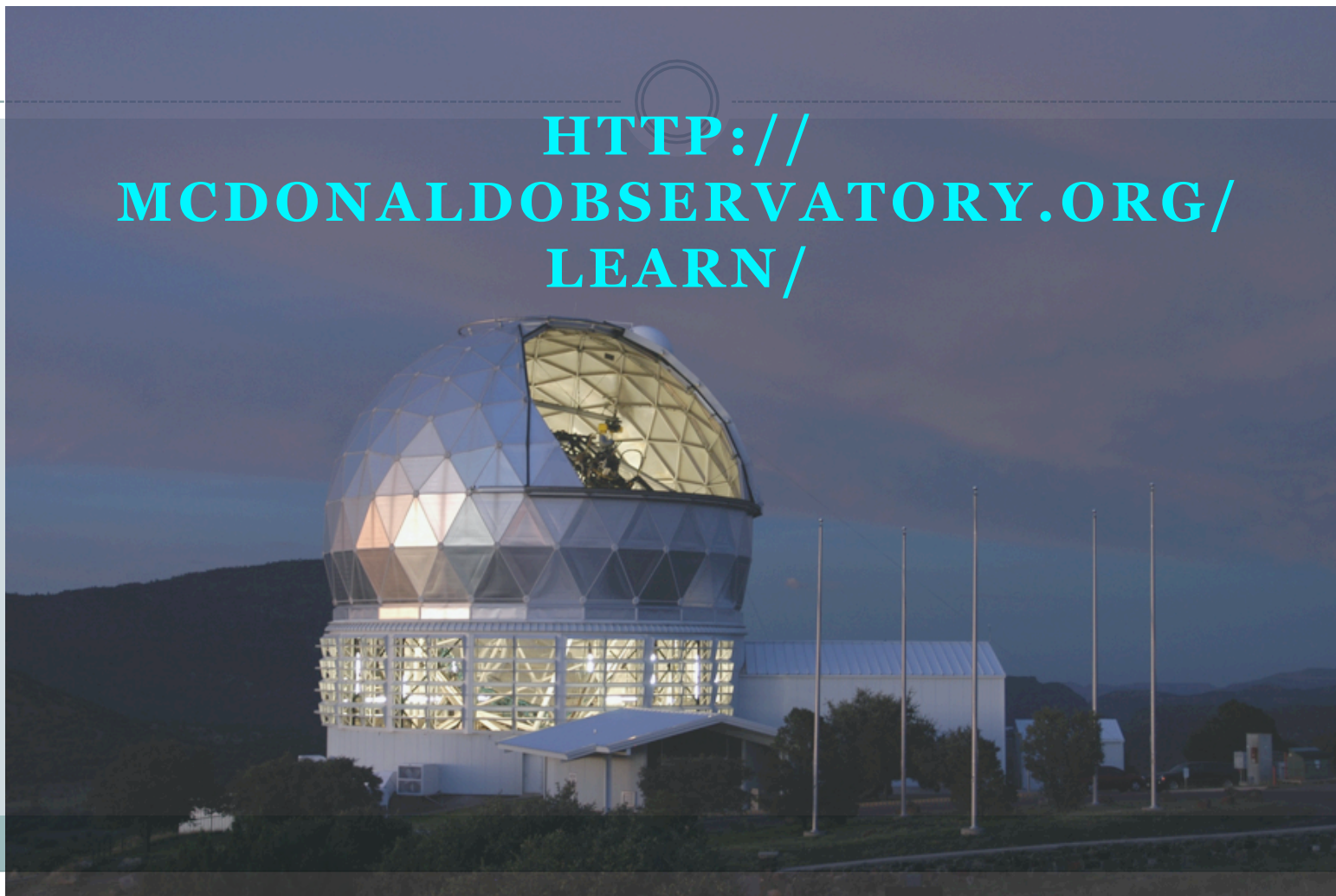
- Classroom Activities and Resources:
  - Activities done in this WS, along with many others can be found at:
  - <http://mcdonaldobservatory.org/teachers/classroom/>
- Student Field Trips – Virtual or Onsite Visits:
  - Virtual Tours of the Observatory as part of “**Live...from McDonald Observatory**” Program with live in classroom video-conferencing
  - Onsite Field Trips – with hands-on inquiry based activities, and tours of the Observatory
  - <http://mcdonaldobservatory.org/teachers/visit/>



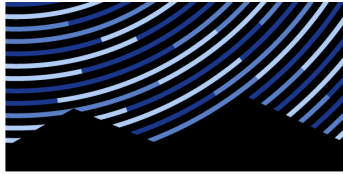
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# Teacher/Student Resources and Programs

[HTTP://  
MCDONALDOBSERVATORY.ORG/  
LEARN/](http://mcdonaldobservatory.org/learn/)





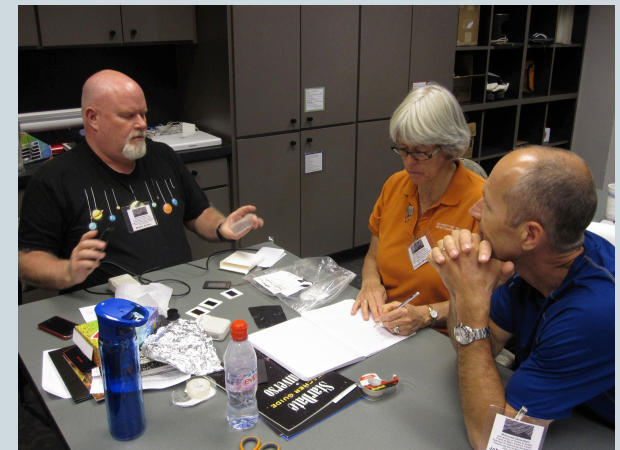


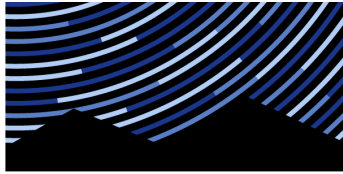
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# Teacher Professional Development Workshops:



Apply Online at:  
<http://mcdonaldobservatory.org/teachers/profdev/>





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# Summer 2013 Workshops:

<u>Name</u>	<u>Dates</u>	<u>Grades</u>
• <u>Earth and Space Science</u>	June 17 – 19	9-12
• <u>Solar Systems Uncovered</u> *	June 20 – 22	6-12
• <u>Explore Our Solar System</u>	July 8 – 10	K-8
• <u>Stellar Explosions!</u>	July 17 – 19	8-12

\* This WS is funded by NASA – covers lodging, meals, and program fees.  
Other programs listed are \$600, although pending funding for others may become available, TBD.

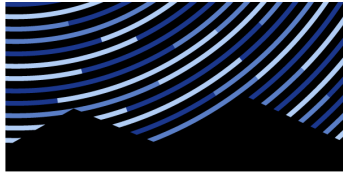
\*\* Deadline to apply is February 8, 2013:

<http://mcdonaldobservatory.org/teachers/profdev/>

## Other Resources at McDonald Observatory:



- Classroom Activities and Resources:
  - Activities done in this WS, along with many others can be found at:
  - <http://mcdonaldobservatory.org/teachers/classroom/>
- Student Field Trips – Virtual or Onsite Visits:
  - Interactive videoconference experiences for your classroom as part of “**Live...from McDonald Observatory**” Program with real-time telescope observations.
  - Onsite Field Trips – with hands-on inquiry based activities, and tours of the Observatory.
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## Other Teacher Resources:



- **Project Share website** – Partners are the TEA, New York Times Knowledge Network, and PBS
- McDonald Observatory/StarDate is a contributor
  - Good resource for students wanting to do research, more vetted than wikipedia, google searches, etc.
  - Professional learning communities for educators to collaborate and participate in online opportunities
  - <http://projectsharetexas.org/>
  - Contact your district IT rep or education service center to get an account