

## STARS

### Program Summary

STARS focuses on the lives of the stars, how they are born, how they die, and how human understanding of the stars has changed over time. From Native Americans to Newton, from the electromagnetic spectrum to Einstein, audiences will explore nebulae, star clusters, pulsars, black holes, and more.

This dramatic program features the voice talent of Mark Hamill. The Nashville Symphony Orchestra, conducted by Albert-George Schram, resident conductor, performed part of the STARS soundtrack. STARS was made possible, in part, by a gift from SunTrust Bank, Inc.

### Tennessee Science Standards

1. Earth And Its Place In The Universe 7.0
2. Forces and Motion 11.0
3. Energy 14.0

### Objectives

1. Define and describe two types of stellar objects: such as an average star like the Sun, nebula, star cluster, pulsar, supernova, or black hole.
2. Define and describe the components that make up the electromagnetic spectrum.
3. Identify at least one cultural advancement in human understanding of the sky.

### Pre-Visit Activities

1. Download the monthly star chart from our website. Encourage students to locate the constellations and any planets visible in the evening sky.
2. Have the students read myths or stories involving the constellations. Encourage them to find early explanations for what the stars were, the Milky Way, aurora, comets, the cause of day and night or the seasons, and other astronomical phenomena.
3. Ask students to describe the typical lifecycle of different types of stars: the Sun, star cluster, black hole, etc. How do they think the Sun will die?
4. Observe the Sun using safe, non-direct methods such as pinhole projection, telescope projection, or a sunspotter.

### Post-Visit Activities

1. Based on the information from the show, ask students to briefly describe the typical steps in a star's lifecycle.
2. Have the students investigate solar topics such as sunspots, the solar cycle, flares and prominences, and how the Sun affects climate on Earth. This activity could also be expanded to include seasons, weather patterns, magnetic fields, CMEs, etc.
3. Present and explore the Hertzsprung-Russell (H-R) diagram and how it graphically illustrates the different types and lives of stars.
4. Have students investigate the different classes of stars: O, B, A, F, G, K, M, R, N. How are these stars different from one another?

### Vocabulary

black hole  
 constellation  
 core  
 electromagnetic spectrum  
 galaxy  
 gamma rays  
 globular star cluster  
 gravity  
 Great Orion Nebula  
 Milky Way  
 nebula  
 nuclear fusion reactions  
 pulsar  
 radio telescope  
 radio waves  
 red giant star  
 spectrum  
 supernova  
 telescope  
 ultraviolet  
 x-rays  
 yellow dwarf star

5. What are the prospects of different classes of stars having planets? If they had planets, how would life have to develop and adapt to survive under different environmental conditions?
6. An armada of spacecraft has been launched to study the Sun. Have students research various missions such as SOHO, TRACE, STEREO, Ulysses, Hinode, and others.

## Exhibit Connections

### Space Chase

The movement of the earth around the sun can be seen in the Earth-sun orrery in the solar System Survey.

Students can explore the Solar System Touchscreens to learn more about the Sun and human exploration of Earth's planetary neighborhood.

### Wonders of the Universe

On the second floor, the 3-d stars let students see that the stars are not all the same distance away, and that the patterns we see are unique to our position in space.

## Resources

### Books

*The Brightest Stars: Discovering the Universe through the Sky's Most Brilliant Stars* by Fred Schaaf

*The Sun* by Steele Hill and Michael Carlowicz

*Extreme Stars* by James B. Kaler

*The Cambridge Encyclopedia of Stars* by James B. Kaler

*The Little Book of Stars (Little Book Series)* by James B. Kaler

*The Sun* by Seymour Simon

*The Sun Observer's Guide* by Pam Spence

*An Introduction to the Sun and Stars* by Simon Green

*Sentinels of the Sun: Forecasting Space Weather* by Barbara B. Poppe and Kristen P. Jordan

*Totality: Eclipses of the Sun* by Mark Littmann, Fred Espenak, and Ken Willcox

*Stars and their Spectra: An Introduction to the Spectral Sequence* by James B. Kaler

*The Ever-Changing Sky: A Guide to the Celestial Sphere* by James B. Kaler

*Touch the Sun* by Noreen Grice a NASA Braille book

### Websites

Monthly star charts, related articles plus schedule of events such as FREE public star parties:  
[www.SudekumPlanetarium.com](http://www.SudekumPlanetarium.com)

Stars by James Kaler

<http://www.astro.uiuc.edu/~kaler/sow/sowlist.html>

STEREO spacecraft

<http://stereo.gsfc.nasa.gov/spacecraft.shtml>

Hinode spacecraft

[http://solar-b.nao.ac.jp/index\\_e.shtml](http://solar-b.nao.ac.jp/index_e.shtml)

Ulysses

<http://ulysses.jpl.nasa.gov>

Transit of Venus Prepares educators and the public for the rare Transit of Venus on June 5-6, 2012, with hands-on activities; maps, science, math, and history lessons.  
[www.transitofvenus.org/](http://www.transitofvenus.org/)

Mythology:

<http://www.bulfinch.org/>

<http://www.pantheon.org/>

<http://homepage.mac.com/cparada/GML/>

Solar System Exploration (including an exhaustive list of planetary missions, past present and future)

<http://solarsystem.nasa.gov>

StarDate - daily astronomy radio program:

<http://stardate.org/teachers/classroom.html>

Sky and Telescope's "This Week's Sky at a Glance":

<http://www.skyandtelescope.com/observing/ataglance>