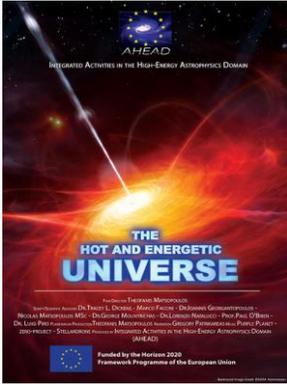




KIDSPACE

A CHILDREN'S EXPLORATION CENTER

Educator Viewing Guide



The Hot and Energetic Universe (2016)

30 minutes

This show presents the achievements of the modern astronomy, the most advanced terrestrial and orbital observatories, the basic principles of electromagnetic radiation and the natural phenomena related to the High Energy Astrophysics.

The XMM-Newton and the Integral missions, are leading the exploration of the X-ray and gamma-ray universe. ESA's mission ATHENA, to be launched in 2028, will carry the most sensitive X-ray telescope ever and it will be the flagship of all high X-ray missions.

Topics covered:

Astronomy, solar system, telescopes, formation of the universe

Interdisciplinary connections: physics

Key Terms and Concepts:

Atmosphere, Black Hole, Galaxy, Orbit, Orbital Observatories, Planet, Star, Supernovae, Telescope, Universe

Combine with these KidSpace Activities:

Magnetic Lab

Investigate the push and pull forces of magnetism while guiding the unique material, Ferrofluid, a nanometer-sized particle that acts like a magnetic solid and liquid.

Launch Lab

Learn the force needed to send rockets into the air. Take aim with our stomp rockets while investigating science concepts: rocket design, force, gravity, altitude, resistance, and more.

PlaySpace!

Science begins with imagination. The space-themed playground offers many opportunities for space-themed play, space-related discoveries, and demonstrations of science concepts: gravity, friction, force, laws of motion, and more.



Learning Resources and Activities:

Create learning units designed around a visit to KidSpace! These web resources and activities are designed to illustrate concepts and ideas presented in the show. Many of these can be adapted to various age groups.

Modeling the Universe; Harvard-Smithsonian Center for Astrophysics

This site includes downloadable resources for several activities: *Modeling the Universe*, *How Big is the Universe*, *How Old is the Universe*, and *What's in the Universe*.

<https://www.cfa.harvard.edu/seuforum/mtu/>

From Earth to the Universe: Activity Space Travel; Chandra X-Ray Observatory NASA

This activity is designed to help learners understand and measure distances to astronomical objects from the Earth and determine travel time. Includes worksheets, flash cards, and links to resources.

http://chandra.harvard.edu/resources/handouts/constellations/activities/space_travel.pdf

NASA Space Place: Classroom Activities; NASA

This resource contains several space-related activities for the classroom. Must scroll down to find link to downloadable pdf of activity. Related activities include: *Telescope as Time Machine*, *Detwinkling the Stars*, *Launch a Frisbee into Orbit*, *Design and Build Your Own Spacecraft* and more.

<https://spaceplace.nasa.gov/classroom-activities/en/>

Black Holes; Universe in the Classroom, Astronomical Society of the Pacific

This resource includes background information about black holes, discussion of myths and science fiction about black holes and two activities: *Shrinking* and *A Scale Model of a Black Hole*.

<https://www.astrosociety.org/edu/publications/tnl/24/24.html>

Model of the Black Hole; Universe Awareness (European Union)

This site contains description, directions, learning objectives, background information, and demonstration pictures for building a model of a black hole. Helps learners visualize how black holes can bend space and time.

<http://www.unawe.org/activity/eu-unawe1308/>

Exploring the Universe: Pack a Space Telescope; NISE Network

This resource contains all downloads needed for participants to design, build, pack, and deploy their own model space telescopes (Spanish and English available). Includes learning goals and how-to videos.

<http://www.nisenet.org/catalog/exploring-universe-pack-space-telescope-2018>

Planet Tours; McDonald Observatory

This activity combines creativity with knowledge about the solar system. Includes full directions and assessment guidance.

<https://stardate.org/teachers/activities/planetstours>



Comprehension Questions:

Help learners process the concepts and ideas presented in the show with these questions.

1. Why are telescopes positioned away from cities?
2. Why was the Hubble space telescope an important step in exploring the universe?
3. What was the Hubble space telescope able to see that telescopes on Earth are unable to?
4. What types of observations can be made from orbital observatories?

Further Research and Discussion

Encourage learners to research images collected from one of the orbital observatories mentioned in the show (Hubble space telescope, Chandra X-ray telescope, XMM-Newton satellite). What do these images show? What new knowledge did they contribute to astronomy? Learners can present their findings individually or in groups.

This show covers content that addresses Colorado Academic Standard in Science (Physical Science and Earth Systems Science). See [Planetarium Show Academic Standard Chart](#) for details by grade.