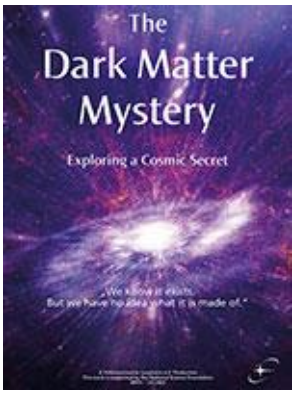
Educator Viewing Guide



The Dark Matter Mystery (2015)
38 minutes

What keeps Galaxies together? What are the building blocks of the Universe? What makes the Universe look the way it looks today? Researchers all around the world try to answer these questions. We know today that approximately a quarter of the Universe is filled with a mysterious glue: Dark Matter. We know that it is out there. But we have no idea what it is made out of.

This planetarium show takes you on the biggest quest of contemporary astrophysics. You will see why we know that Dark Matter exists, and how this search is one of the most challenging and exciting searches science has to offer. Join the scientists on their hunt for Dark Matter with experiments in space and deep underground. Will they be able to solve the Dark Matter Mystery?

Topics covered:

Astronomy, dark matter, gravitational laws, experimental science

Interdisciplinary connections: history of science, telescopes

Key Terms and Concepts:

Big Bang, Dark Matter, Kepler's Law of Planetary Motion, Galaxy, Galaxy Cluster, Gravity, Gravitational Calculations, Gravitational Lensing, Orbit, Solar System, Theory of Relativity

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.

Educational Resources for Dark Matter Day; Interactions Collaborations
Dark Matter Day is celebrated on October 31, but these resources and activities can be done any time of year. Includes links to several activities about dark matter.
https://www.darkmatterday.com/educational-resources-dark-matter-day/

Dark Matter Possibilities; NASA Goddard Space Flight Center
This site provides directions, student worksheet, and links to resources for a research project about dark matter. Includes assessment rubric.
https://imagine.gsfc.nasa.gov/educators/galaxies/imagine/act_dark_matter.html

Dark Matter: Probing What You Can't See; Sonoma State University
This resource contains background information and activities designed to illustrate searching for dark matter. Includes activity lab sheet where participants investigate "hidden matter" between paper plates.
https://universe.sonoma.edu/activities/dark_matter.html

CERNland; An interactive website for kids; CERN
This "virtual theme park" contains games, multimedia applications, and videos designed to inspire children (7-12) with physics. Interactive website for children to learn about particle-physics, science news, atoms, and more. Available in multiple languages.
http://www.cernland.net

Exploring the Universe: Objects in Motion; NISE Network
This resource contains all downloads needed for participants to explore the complex and predictable ways objects in the universe interact with each other. Includes learning goals and videos (Spanish and English available).
http://www.nisenet.org/catalog/exploring-universe-objects-motion-2018

Exploring Magnetic Fields; American Association for the Advancement of Science (AAAS)
This site contains lesson plans and directions for two activities designed to explore magnetic fields. Includes material list, directions, student worksheets, assessment and extensions.
http://sciencenetlinks.com/lessons/exploring-magnetic-fields/

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

Comprehension Questions:

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

1. How is the gravitational pull of the solar system similar to a merry-go-round?
2. What physical laws allow scientists to predict the motions of planets?
3. What momentous discovery did Hubble make?
4. What evidence do scientists have that supports the existence of dark matter?
5. What are three ways scientists are conducting experiments to detect dark matter?

Further Research and Discussion

Learners conduct further research into new discoveries in dark matter. Ask them to conduct thought experiments about the nature of dark matter and its role in the universe.

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.