

# **LIGHT YEARS FROM HOME**

## **OBJECTIVES:**

- To gain insight of where we are at in this huge universe of ours.
- To explore how we know where we are at in the Milky Way Galaxy
- To learn some of the current constellations and location of the planets
- To experience the universe on its grandest scale (looking at galaxies and clusters of galaxies).
- To view the structure and lay-out of our solar system and how the planets orbit the Sun.

This show conforms to the following Illinois state science standards: 12.F.1b, 12.F.2a, 12.F.2b, 12.F.2c, 12.F.3b, 12.F.3c, 12.F.4b, 12.F.5b. Next Generation Science Standards: 1.ESS1.1, 5.ESS1.1, MS.ESS1.2, MS.ESS1.3, HS.ESS1.4

## **BRIEF SHOW DESCRIPTION:**

“Light Years” is a completely live show that came out of “playing” with our Digistar digital projection system after its installation. We set the Sun and look at the current sky, identifying the current planets and constellations of the season. Then we leave the Earth to look down on it as a planet, then pull back faster and faster. We look at the solar system from afar and watch the planets and asteroids orbit the Sun, then leave the solar system to fly past some of the nearer stars. We then look at our Galaxy and our place in it before seeing it as part of a cluster called the Local Group. Finally the Local Group recedes to be just another galaxy cluster amongst the large scale structure of the universe. The show emphasizes the vastness of the universe and our place in it.

## **PRE-VISIT ACTIVITIES/TOPICS FOR DISCUSSION:**

- Download and copy star charts for the class from the Staerke Planetarium web site and talk about the constellations you can see from your backyards.
- If you were to address a letter, you would put the name, address, city, state and zip code on the envelope. But what if we continued to write? What comes next? Probably country, then what? Continent? Hemisphere? Planet? Solar system? Galaxy? Galaxy cluster? Supercluster? Have the students brainstorm their lists in groups.
- Model the solar system in the classroom with common household items. You can use the planetarium’s model of the solar system as a guide (Sun is a beach ball 38-inches in diameter, then Jupiter is a softball, Earth is a marble, etc). Challenge students to guess how far apart the planets would be. The dimensions are on the web site (see below). The Earth would be 110 yards (one full football field, with one end zone) away!

## **POST-VISIT ACTIVITIES/TOPICS FOR DISCUSSION:**

- After you have seen the show, discuss how much space is there in space. Were the distances traversed closer or farther than you expected?
- Make a model of the Milky Way Galaxy by taking two paper plates and stapling them together, with one of the plates being inverted to the other. Students can then research what we think the galaxy looks like and draw that on the face of their plates. Be sure to mark about where the Sun would be (on the edge of a spiral arm, a little over halfway from the center to the edge).
- Have one or more students model some other galaxies based on the activity in the previous bullet. If the Milky Way is roughly 100,000 light years across, how far away (on the scale of the

paper plate) would the Andromeda Galaxy be? Hint: If Andromeda is 2.2 million light years away, it would be 22 paper plate diameters from the Milky Way!!

- Bring in a large sponge and cut it in half. Have the students describe what it looks like. There are places where there is “sponge” and other areas that are voids or empty areas. The universe seems to be arranged that way on its largest scale with galaxies being the sponge!
- Walk the planetarium’s scale model solar system while on your field trip. The Sun is located across the perimeter road to the west of the dome. You can ask the show operator about it if you wish.

#### **VOCABULARY LIST:**

Constellation	Light year
Galaxy	Nebula
Globular Cluster	Orbit

#### **INTERNET RESOURCES:**

- Powers of ten: <http://www.eamesoffice.com/the-work/powers-of-ten/> and <https://www.youtube.com/watch?v=k-xcc2vGE7s>
- An interactive guide to the scale of the universe: <http://scaleofuniverse.com/>
- Maps of the Galaxy and the neighborhood: <http://www.atlasoftheuniverse.com/galaxy.html>
- NASA’s Milky Way page: [http://www.nasa.gov/mission\\_pages/GLAST/science/milky\\_way\\_galaxy.html](http://www.nasa.gov/mission_pages/GLAST/science/milky_way_galaxy.html)
- WMAP animations: <http://map.gsfc.nasa.gov/media/990320/index.html>
- Hubble Space Telescope images: <http://hubblesite.org/gallery/>
- The Staerckel Planetarium’s scale model solar system: <https://www.parkland.edu/Audience/Community-Business/Parkland-Presents/Planetarium/Educational-Resources/Campus-Solar-System>