

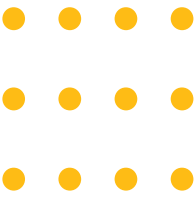


STATEWIDE
STAR PARTY

A Universe of Galaxies

FACILITATOR GUIDE

ncscifest.org/starparty



OBJECTIVE

Explore the relative distances from the Milky Way Galaxy to other galaxies

SUGGESTED AGE RANGE

Adults, families with children ages 6 and up

ACTIVITY DURATION

10-15 minutes

MATERIALS

- CD to represent the Milky Way Galaxy
- CDs to represent other galaxies

Optional: cotton ball and glue stick



SETTING

A large area with a lot of room to spread out

PROCEDURE

1. Invite your participants to build a model of the universe with you.
2. You might begin by establishing the difference between our *solar system* (which has only 1 star, the Sun), our *Milky Way Galaxy* (a “city” of about 200 billion stars, which includes our Sun and all the stars you can see at night), and our *universe* (consists of the Milky Way Galaxy and billions of other galaxies).
3. Explain that your participants will make a model to help visualize the observable universe by shrinking down all the sizes and distances.
4. Hold up the Milky Way Galaxy CD. Explain that the Milky Way is a barred spiral galaxy and its visible part is shaped roughly like this CD, wide and relatively thin, with a bulge of stars in the middle (optional: glue a piece of cotton to the center to represent the bulge). In our scale model, we’ll shrink the galaxy down to the size of this CD.
5. Point to “You are here” on the CD. Explain that our solar system is located about halfway out from the center of the Milky Way Galaxy. We can’t actually see our Sun on this CD—that would be like trying to pick out your porch light on a satellite photo of the U.S. at night.
6. Ask: How far do you think other galaxies in the universe would be on this scale?
7. Invite someone to be the Milky Way Galaxy, and hand them that CD.
8. Pull out the Andromeda Galaxy CD, and pick someone to be that galaxy. Ask them to guess how far away they should stand from the Milky Way. Flip over the CD to reveal the answer: 10 feet. Ask that person to take the CD about 10 feet away from the Milky Way Galaxy (an adult stride is around 3 feet).
9. Hand the other galaxy CDs to different people. With the Milky Way Galaxy person in the middle, have the others pace off in various directions to the appropriate distance for their galaxy. Stop before you get to the quasar and deep field CDs.
10. Note that these are just a few of the many billions of galaxies in our universe, and they’re ones that are relatively close to us. You may be able to see some of them in a telescope.

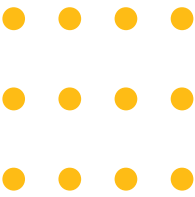
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A Universe of Galaxies

FACILITATOR GUIDE, CONTINUED

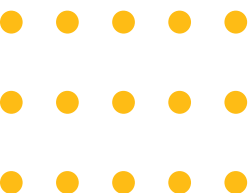
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11. Call everyone who's holding a galaxy back in. Hold up the CD representing the quasar 3C 273, a very bright galaxy. Explain that it's about 2.5 billion light-years away and is the most distant object most backyard telescopes can see. On this scale, that's 2 miles away.
12. Finally, hold up the Webb's First Deep Field CD. Some of the galaxies in this image are near the limit of the observable universe, more than 13 billion light-years away. Ask for guesses about how far away those galaxies would be on this scale. Flip the CD over to reveal the answer: about 10 miles, or about as far away as (pick a city or landmark about 10 miles from your location).
13. Explain that there are hundreds of billions of galaxies within the observable universe. You could fill up a football stadium to the top with this many CDs. Imagine these CDs distributed all around us, from a few feet out to 10 miles away in any direction.

BACKGROUND & PRESENTER TIPS

1. On this scale, 1 million light-years equals 4 feet.
2. The Milky Way CD has an image of M74, to represent roughly what our Milky Way Galaxy would look like if we could go far enough out in space to take a photo of it.
3. Optional: Glue a small piece of cotton to the center of the Milky Way CD to represent the central bulge.
4. Galaxies come in a variety of sizes and shapes. The sizes of the galaxies on the CDs are not represented to scale—just the distances between them.
5. When you say that the observable universe extends 10 miles in any direction, your participants may mistakenly think that we are in the center of the universe. One way to address this is to say: No matter which galaxy you lived in, you would still only be able to see light coming from galaxies no more distant than about 13 billion light-years—back to just after the Big Bang. Or 10 miles on this scale. So there is no “center” to the universe. Every galaxy will appear from its own perspective to be at the “center.”
6. This activity pairs well with telescope observing of galaxies.
7. Need to simplify this activity, or don't have a large space? Focus only on having volunteers model the relative distance between



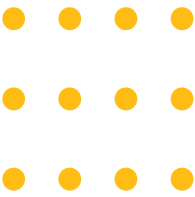


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the Milky Way Galaxy and the Andromeda Galaxy, and simply discuss relative distances to other galaxies, without sending anyone out to those distances.

MORE RESOURCES

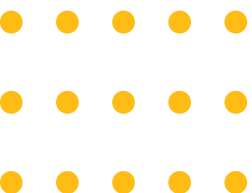
To learn more about Webb's First Deep Field, see <https://www.nasa.gov/image-article/nasas-webb-delivers-deepest-infrared-image-of-universe-yet/>

For a more in-depth discussion that takes into account the expansion of the universe, see <https://www.space.com/24073-how-big-is-the-universe.html> and <https://www.astronomy.com/science/size-of-the-universe/>

Watch Night Sky Network's activity demo (5 minutes): <https://nightsky.jpl.nasa.gov/news/376/>

CREDIT

Adapted with permission from NASA's Night Sky Network, <http://go.nasa.gov/nightskynetwork>



The Statewide Star Party is made possible by the generous grant support of the North Carolina Space Grant.