FSC PROGRAM DESCRIPTION
BLKH - Black Holes

Grade Level: High School (10-12)

Instructor: Lancaster

Location: Fernbank Science Center

Type: Planetarium lesson

Capacity: 200

Length: 75 Minutes

Program Description

Black Holes takes you on a fully immersive journey through one of the most mystifying, awe-inspiring phenomena in the universe: a black hole. Where do they come from? Where do they go? How do we find them? Is there one on Earth's horizon? What was Einstein's connection to them?

We will also explore stellar evolution - the life cycle of a star. What is the significance of a star's color? Why can't we see the majority of stars that are in our stellar neighborhood? What will be the fate of our Sun? These questions among others will be answered on our journey.

Georgia Performance Standards

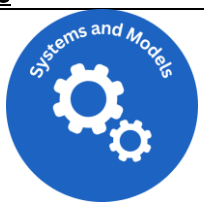
SAST5. Obtain, evaluate, and communicate information about the connections between mass, gravity and fusion with respect to the life cycle of stars.
a. Develop and use models to explain the process of stellar evolution from star birth to star death, including binary systems. b. Construct an argument based on evidence from the Hertzsprung-Russell diagram to assess the properties of stars, including density, luminosity, temperature, rates of fusion, and spectral class.
c. Ask questions to evaluate evidence that predicts the lifespan and final stage of stellar evolution based on mass. (Clarification statement: Include stellar remnants and events such as neutron stars, pulsars, black holes, supernovae.)
d. Construct an argument based on evidence that explores the connections among various cosmic phenomena and leading theories.
SPS4. Obtain, evaluate, and communicate information to explain the changes in nuclear structure as a result of fission, fusion and radioactive decay.
SPS7. Obtain, evaluate, and communicate information to explain transformations and flow of energy within a system

Vocabulary

Black Hole, Planetary Nebula, Quasar, Pulsar, Luminosity, Main Sequence, Red Giant, Red Supergiant, White Dwarf, Fusion, Neutron Star, Nova, Supernova

Learning Targets	Success Criteria
Students will understand the formation, properties, and significance of black holes, including their relationship to Einstein's theories.	Students can explain how black holes form, where they are located, and their connection to Einstein's theories.
Students will explore the life cycle of stars, including the significance of their color, visibility, and eventual fates.	Students can describe the stages of a star's life cycle, explain the significance of a star's color, and discuss the eventual fate of the Sun.
Students will connect concepts of stellar evolution and black holes to larger questions about the universe and Earth's place within it.	Students can articulate the role of black holes and stars in understanding the universe, including their significance in relation to Earth and its cosmic neighborhood.

Science Cross-Cutting Concepts

		
Students will understand the patten of the Life Cycle of a star	Students will examine the scale and proportion of the Universe and its components	Students will understand and be able to model the life cycle of a star based on its mass.

Science and Engineering Practices

		
Students ask questions about the universe and the many unknowns about it.	Students construct explanations about how the Universe and stars formed.	Students engage in discussions about potential issues for civilizations that may have a star nearing the end of its life cycle.

Pre-Visit Activities
Have students understand the difference between the key vocabulary terms
Post-Visit Activity
Have students create their own HR Diagram
https://www.copley-fairlawn.org/cms/lib4/OH01001067/Centricity/Domain/460/H-R%20Diagram%20Wksht.pdf

Roles & Expectations
Students

- Students are expected to be respectful, ask questions, remain engaged, and avoid distractions like cell phones.

FSC Instructor

- Prior to the program, the FSC Instructor will communicate with the classroom teacher to develop a schedule and to share the roles and expectations.

Classroom Teacher

- The Classroom Teacher is an integral part of the class, and the Classroom Teacher's attentiveness is essential to the success of the program.
- The FSC Instructor is a classroom guest, therefore the normal classroom duties and responsibilities remain with the Classroom Teacher.
- Attend to the normal beginning-of-class duties, then introduce the FSC Instructor.
- Facilitate FSC Instructor and student interactions, prompt students for participation when appropriate.
- After the program, please complete the FSC Program Evaluation Survey using the link or QR Code below.

FSC Program Evaluation Survey Link:

https://forms.office.com/r/CSCkZYqxjY