



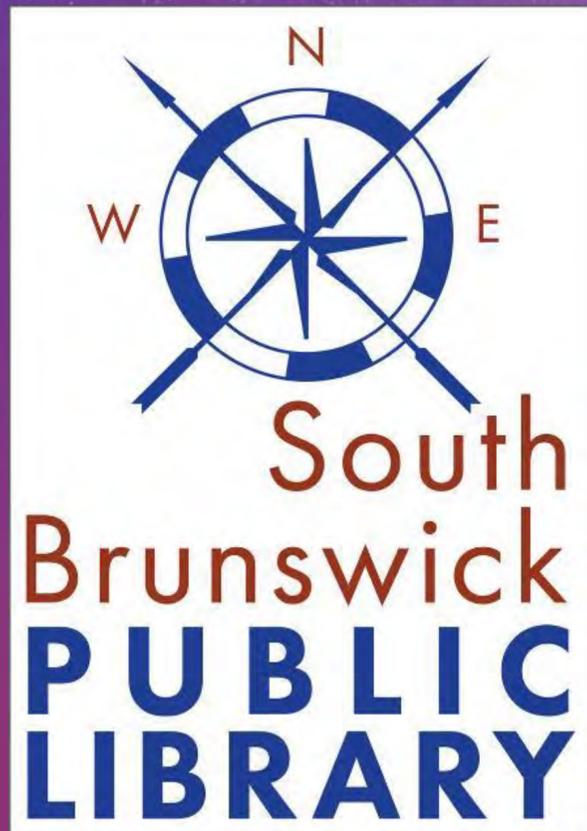
Girls STEAM Ahead with



at South Brunswick Public Library



# about us



- Public library in Central NJ
- Population: Over 47,000 and growing
- Robust population (>50% Indian/South Asian)
- 10 elementary schools, 2 middle schools
- Pre-existing series of tween events

# The plan

**South Brunswick PUBLIC LIBRARY**  
Collaborative Project

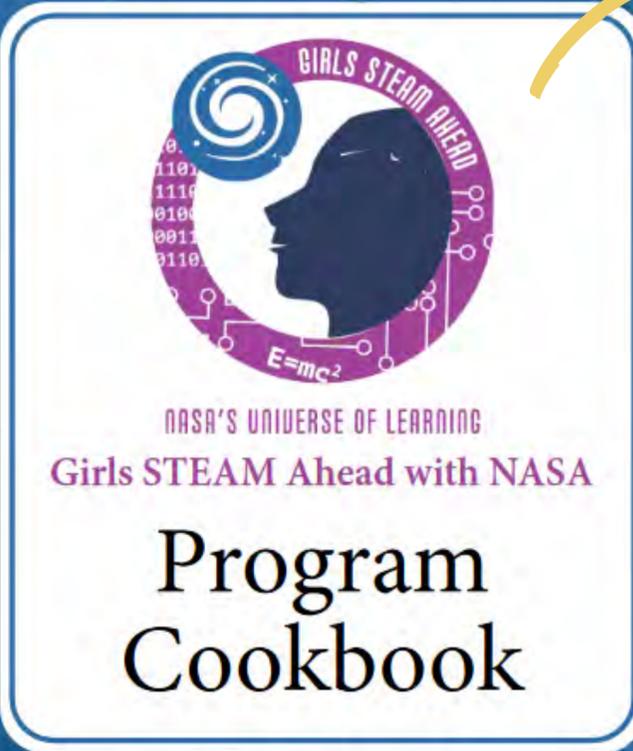
REGISTRATION REQUIRED

FOR GRADES 4-7

**GIRLS STEAM AHEAD WITH NASA**  
THURSDAYS, 5 PM

JULY 13 - EXPLORING LIGHT IN SPACE  
JULY 20 - LIGHT-UP EXPLODED STARS  
JULY 27 - NASA VIRTUAL MEET-AND-GREET (ALL AGES)  
AUGUST 3 - BINARY CODE BRACELETS

- 4-week series promoted/aimed at tween girls
- Summer series
- 3 hand-on activities
- 1 meet-and-greet with NASA expert



**GIRLS STEAM AHEAD**

NASA'S UNIVERSE OF LEARNING  
Girls STEAM Ahead with NASA

# Program Cookbook

Find the complete GSAWN Program Cookbook online:  
<https://www.universe-of-learning.org/gsawn>



# NASA'S UNIVERSE OF LEARNING

### Paper Circuit Activity

A hands-on activity using printable templates and creating simple paper circuits. Good for MakerFaires, libraries, classrooms, and other STEM-related events where participants can create their own take-away.

Cost: About \$0.50 (50 cents) per item. Estimates are provided in the materials list.

Time: about 5 minutes to make a single item.

Age: approximately ages 9 & up (not for very young children/battery is a choking hazard).

**Materials:**

- Coin Batteries (\$0.30 each)
- Copper tape with conductive adhesive (\$0.10). Less than 12 inches per badge.
- LEDs (\$0.05)
- Small binder clips (\$0.05)
- NASA Images of exploding stars/pulsars/neutron stars (PDF linked below).
- Hand held hole punches
- Small trash can – little bits of trash are produced during the activity.

**DOWNLOADS**

[Instructions #1 and #2](#)

[Cards #1](#)

[Cards #2](#)

[Instructions #3](#)

[Cards #3](#)

#### Paper Circuits: Light Up Exploded Stars

What is a Paper Circuit?  
Paper circuits help learners of all ages explore the basics of electricity (energy that results from the existence of charged particles like electrons or protons) and conductivity (the degree to which a material can conduct electricity). Paper circuits function as simple low-voltage electronic circuits (a path through which electrons from a voltage or current source flow) made using paper, LED lights, a type of conductive tape such as copper, as well as a small battery for the power source.

**Directions:**

1. First, download the instructions PDF.
2. Then, download the pdf below and print any of the images double-sized (so the shapes are lined up) and cut in half (you will get two handouts per page).
3. Have participants cut out the rectangle - see handout for instructions.
4. Ask participants to fold paper in half on the dashed line so that the directions are on the INSIDE (images are on the OUTSIDE).
5. Punch a hole for the LED light - see template.
6. Following the remaining steps outlined on the handout - placing copper tape, finding the positive lead on the LED and affixing the leads to the circuit, and folding over with the coin battery.
7. Use a binder clip to hold battery in place on the circuit (so the light stays on).

**Troubleshooting**

Make sure that the positive end of the LED is matching up with the positive end of the battery and that the copper tape is touching the battery. If something isn't working by the following:

- Flip the battery over. If the LED was put in backwards, it just means the positive and negative parts of the circuit are reversed.
- Check all connections - around the LED leads, alignment with the battery, any broken places in the copper tape. Use more tape to reinforce connection.
- Sometimes an LED might not be working correctly so try another one. Once in a while a battery fresh out of the package can also be dead, so try a 2nd battery if all else fails!



NASA'S UNIVERSE OF LEARNING

### Activity Guide

## Light & Color: Exploring Visible Light



**Type of Activity**

- Demonstration
- Facilitated activity
- Independent activity

**Audience**

- Families or other mixed-age groups
- Youth ages 12+

**Prep. Time**

~ 5 - 20 min.

**Activity Time**

~ 10 - 45 min.

**Supply Cost**

~ \$35 - \$40 (initial supply cost)

**Overview**

This activity introduces learners to the visible-light spectrum and color mixing. Learners explore visible light by observing it with diffraction grating glasses to see how it can be broken up into its component colors (red, orange, yellow, green, blue, and violet).

**Main Takeaways**

- The primary colors of visible light are red, blue, and green. When all combined, these colors make white light.
- Combining red, blue, and green light in different ways, and with different intensities, produces different colors of light.
- Breaking light up into its component colors is called spectroscopy, an important tool for studying the universe.

**Inside this Guide**

[Materials & Supplies](#), [Getting Ready](#), [Activity Guidelines](#), [Follow-up Activities & Resources](#), [Family Connections](#), [Science Background Resources](#), [FAQs](#), [FAQs \(versión en español\)](#), [Printable Materials – English & Spanish](#)

Light & Color: Exploring Visible Light | 1 | universe-of-learning.org

### Color Your Universe: Girls STEAM Ahead with NASA @ SBPL

4 week series |  
July 14 through August 4

- The Intended Audience
  - Events will be *advertised* toward girls in grades 4-8
  - Events will be *open* to everyone
- Registration
  - Events will require registration.
  - Registration will be limited for in-person events due to room and material restrictions.
  - Virtual talk (Week 3) will not be limited.
- Budget
  - Total budget: \$400
  - Total expected expenses: \$352 plus tax ( \$381 after NJ sales tax)
  - Total actual expenditure: \$321.54
  - Any unused budget amount will be returned.
- Total expected attendance: 170-230 over four weeks
- The Schedule
  - Week 1: Exploring Light in Space (Thursday July 13)
    - Objective/Lesson
      - Attendees will learn about how we see through space and how light works in space
    - Core Theme:
      - *How Do We Know?*
    - Activities:
      - [Light & Color: Exploring Visible Light](#)
      - [James Webb Space Telescope Model](#)
    - Materials (Expected Total Cost: \$235 + tax)
      - [Flexible LED Light Strip](#) (x2) - \$40
      - [Diffraction grating glasses](#) - \$25 for 50
      - Professional printing for models - \$134.97 for 40 copies
    - Expected attendance: 40-50
  - Week 2: Light Up Exploded Stars (Thursday July 20)
    - Objective/Lesson
      - Attendees will learn about exploding stars and other extreme cosmic phenomena
    - Core Theme:
      - *Life & Death of Stars*
    - Activity
      - [Paper Circuits: Light Up Exploding Stars](#)
    - Materials (Expected Total Cost: \$91 + tax)
      - [Coin batteries](#) (x80) - \$18

# event 1: Exploring Light in Space



[bit.ly/46my67c](https://bit.ly/46my67c)

## Objective:

- Attendees will learn about how we see through space and how light works in space.

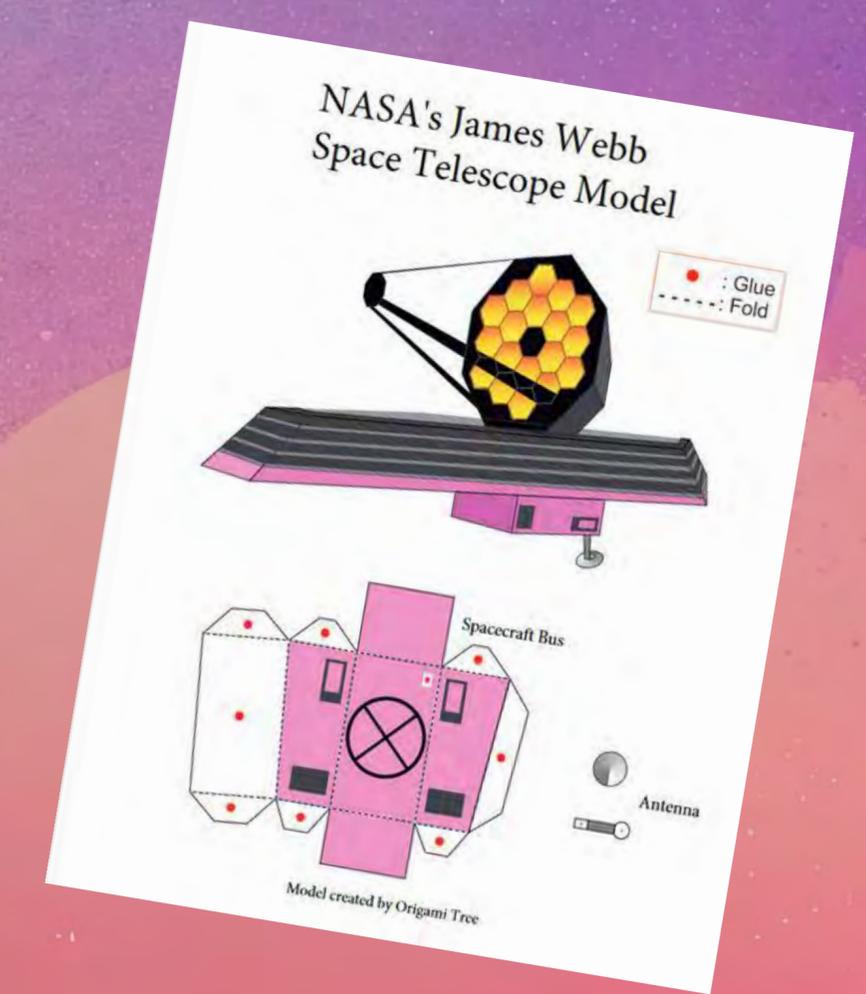
## Core theme:

- How Do We Know?

## Cost:

- Expected: \$381
- Actual: \$321

## Primary Materials:





# event 2: light-up exploded stars



<http://bit.ly/46DGHSU>

## Objective:

- Attendees will learn about exploding stars and other extreme cosmic phenomena

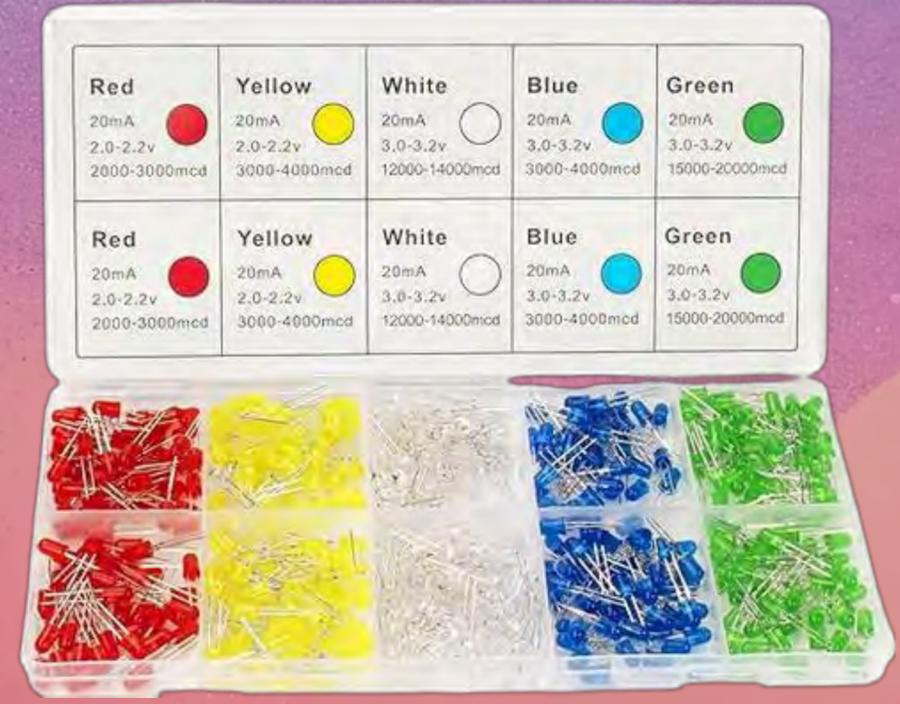
## Core theme:

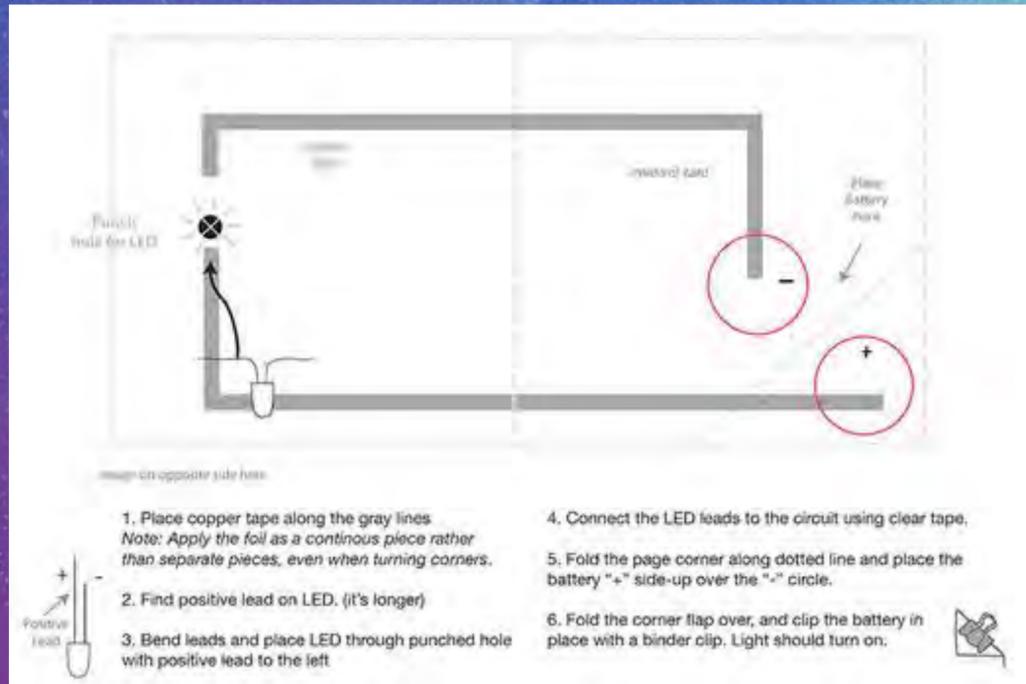
- Life & Death of Stars

## Cost:

- Expected: \$91
- Actual: \$79

## Primary Materials:





# PAPER CIRCUITS

## Cassiopeia A: Supernova Remnant

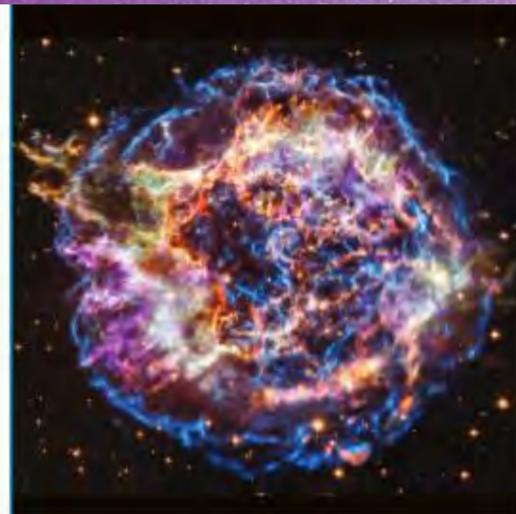
Cassiopeia A is the remnant of a massive star that exploded. The material from the explosion is rushing outward at supersonic speeds in excess of ten million miles per hour. As this matter crashes into gas that surrounded the former star, shock waves analogous to awesome sonic booms heat the gas and heat the ejected matter to temperatures in excess of fifty million degrees Celsius. At the center of the remnant is an enigmatic source, which could be a rapidly spinning neutron star.



Cassiopeia A: Supernova Remnant

## Cassiopeia A: Supernova Remnant

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## Whirlpool Galaxy: Black Holes & Neutron Stars

The Whirlpool is a spiral galaxy with spectacular arms of stars and dust located about 25 million light years from Earth. By studying the Whirlpool in different kinds of light, astronomers can reveal things that would otherwise be invisible. For example, X-ray data reveal over 400 X-ray sources within the galaxy. Most of these are X-ray binary systems, in which a neutron star or black hole is in orbit with a star like our Sun. Understanding where these systems are, how they behave over time, and their role in the evolution of the galaxy is important in helping learn us more about other galaxies including our own.



# event 3:

## nasa expert meet-and-greet

### Objective:

- Attendees will learn about career opportunities in STEAM fields, including those at NASA, notable women in NASA history, and how they can shape their path to a future in STEAM fields.

Request an expert:



<http://bit.ly/46HDi5C>

### Qualities of a Scientist

- Curious
- Observant
- Inquisitive (they ask lots of questions)
- Imaginative and Creative
- Story tellers



# event 4: binary code bracelets



[bit.ly/3RM0ICA](https://bit.ly/3RM0ICA)

## Objective:

- Attendees will learn why coding is important to NASA and how we communicate with rockets

## Core theme:

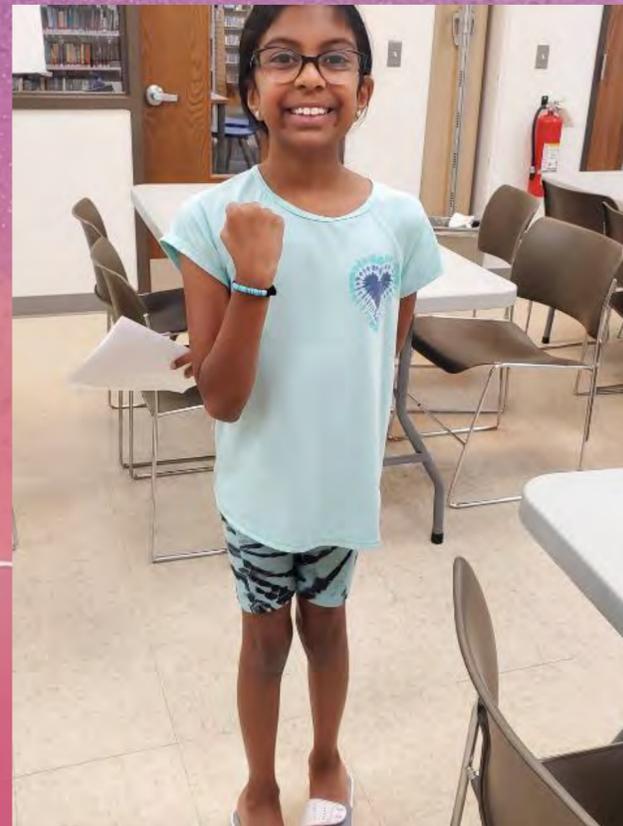
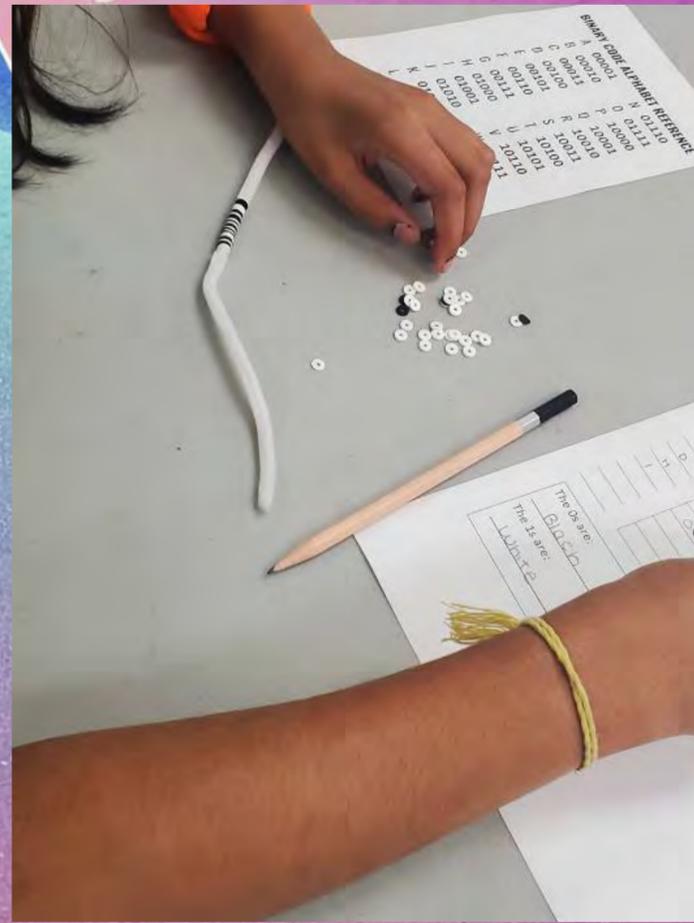
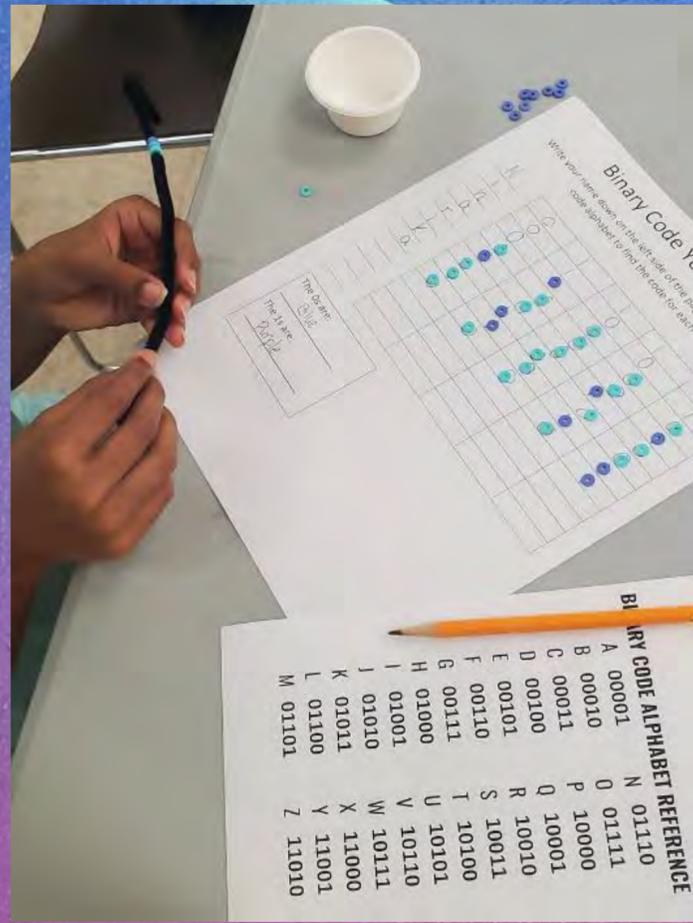
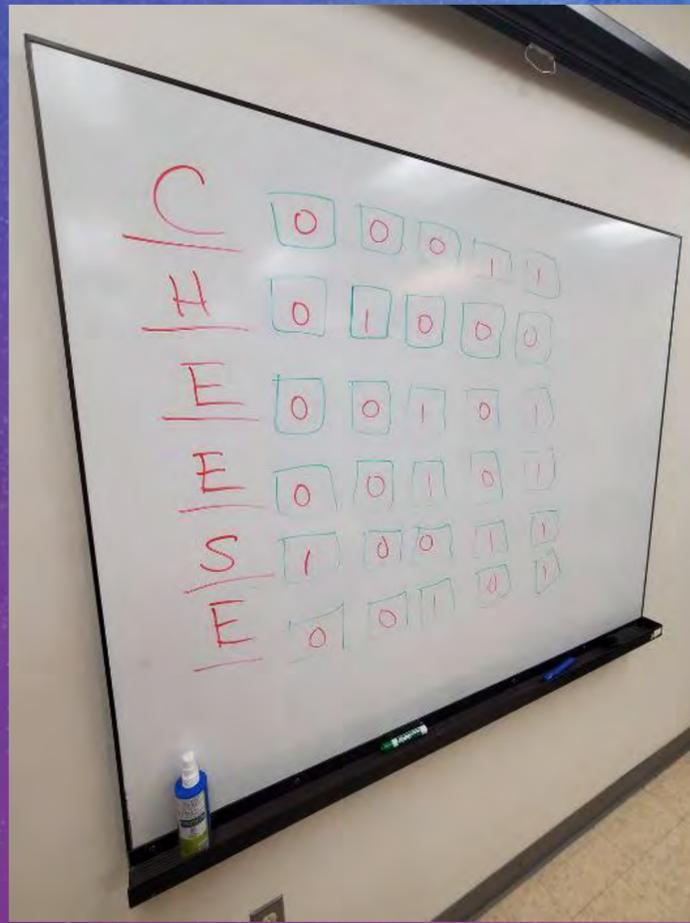
- How Do We Know?

## Cost:

- Expected: \$26
- Actual: \$26

## Primary Materials:





# adjustments & advice

- Request an expert early & often.
- Be patient with BILL.
- Make sure your materials work together.
- Get extra volunteers/staff if you can.
- Keep video presentations short.

# The Good

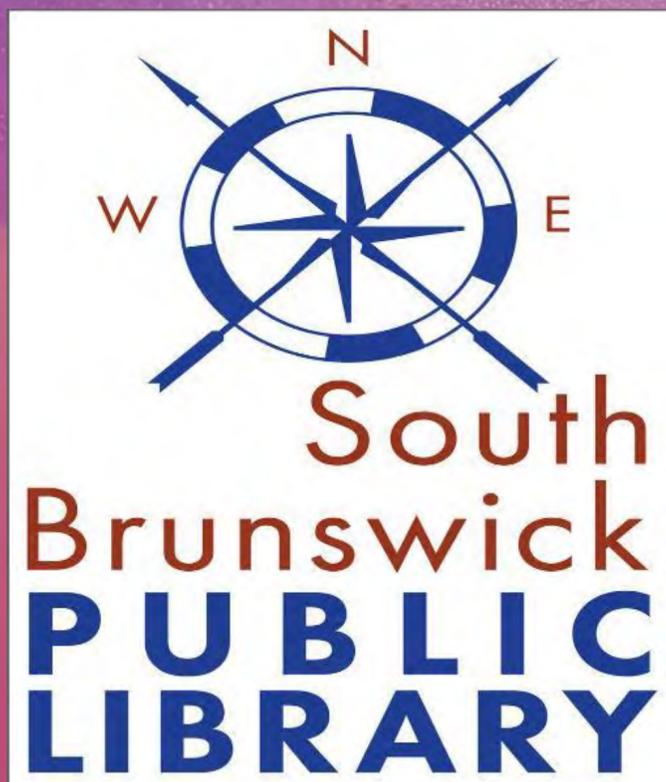
- NGCP's incredible support/communication.
- NASA knows how to pick their experts.
- Sparking the kids' interest.

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<input type="checkbox"/>	CMack@ngcproject.org	GSAWN Resources in Action Webinar	Inbox	Oct 5, 2023
<input type="checkbox"/>	noreply@qemaiserver.com	NASA's Universe of Learning Youth Programming Cookbook: Share Your Feedback!	Inbox	Oct 5, 2023
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<input type="checkbox"/>	girlsSTEAMahead@universe-of-learning.org	NASA's Universe of Learning ViewSpace Resources	Archive	Apr 20, 2023
<input type="checkbox"/>	no-reply@zoom.us	GSAWN Awardee Planning Call Confirmation	Archive	Mar 14, 2023
<input type="checkbox"/>		GSAWN Awardee Planning Call - Registration		

Thank you,  
NGCP!



Exploring

SPACE

with STEAM





# Sequatchie County Public Library

- Sequatchie County, Tennessee
  - City of Dunlap
  - ~17,000 Residents
- + More From Neighboring Counties
- Serving Our Community for Over 60 Years





# Expanding Our Services

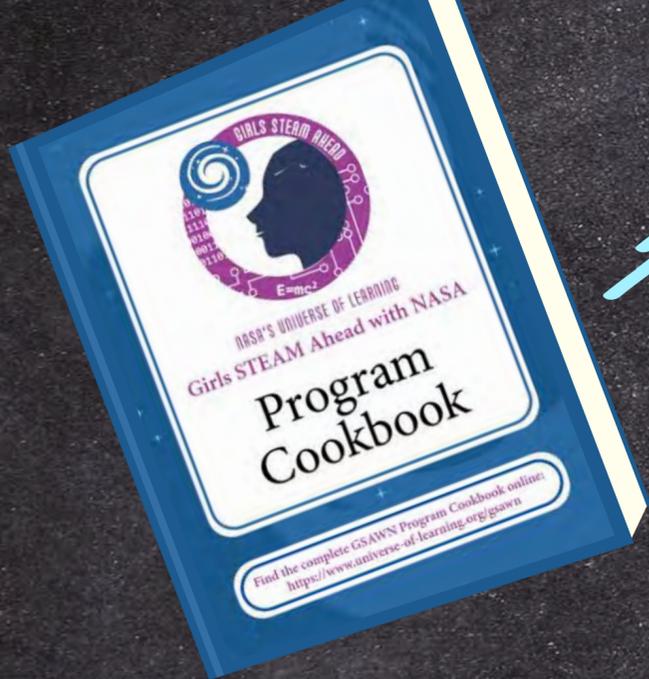
- COVID Shutdown
- New Teen Programs



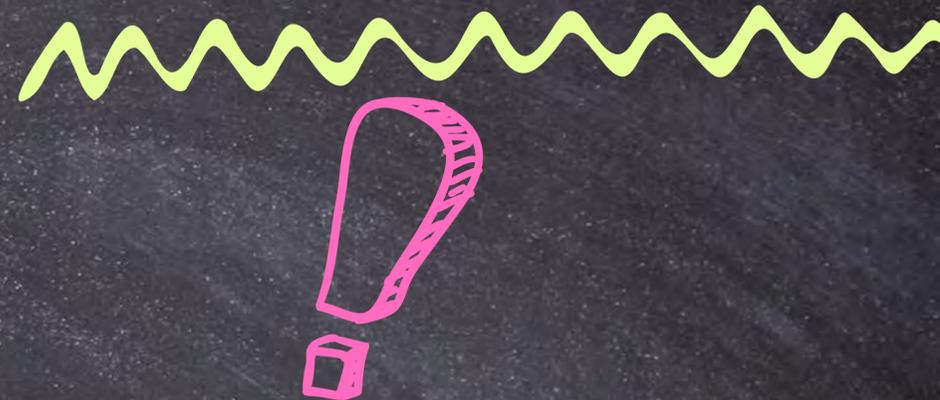
## Girls STEAM Ahead with NASA

- 4 Programs/Sessions
  - Tuesdays at 5PM (1 Hour)
  - July 11 - 18 - 25 + August 1
- |
  - \$400 Stipend
  - 5 Refurbished Chromebooks
  - Print Posters From NASA's Women in STEM Printable
  - Other Materials Supplied by the Library





# Our Program Plan



**TALKING TO SPACE**

Women's Contributions in Binary

Make Binary Name Tags

Make Binary Pins

July 11

**PIXELS TO IMAGES**

Pixels to Images Warm-Up

Breakouts

Decoding Starlight

Micro Observatory Targets

July 18

**MAKING SPACE LOOK GOOD**

Working on our Astrophoto Challenge Images

Breakouts

Astropoetry

Astrophoto Challenge

July 25

**MAKING SPACE LOOK GOOD PART 2**

Working on our Astrophoto Challenge Images

Breakouts

Blackholes: No Escape

Astrophoto Challenge

August 1



# revised Our Program Plan



## TALKING TO SPACE

Women's Contributions in Binary

Make Binary Name Tags

### Breakouts

Make Binary Pins

Intro Astrophoto Challenge

July 11

## PIXELS TO IMAGES

Pixels to Images Warm-Up

Women's Contributions

### Breakouts

Decoding Starlight

Micro Observatory Targets  
& Work on Astrophotos

July 18

## MAKING SPACE LOOK GOOD

Finalize our Astrophotos

Women's Contributions

### Breakouts

Decoding Starlight 2

Finalize + Submit our  
Astrophotos

July 25

## EXPLORING MORE

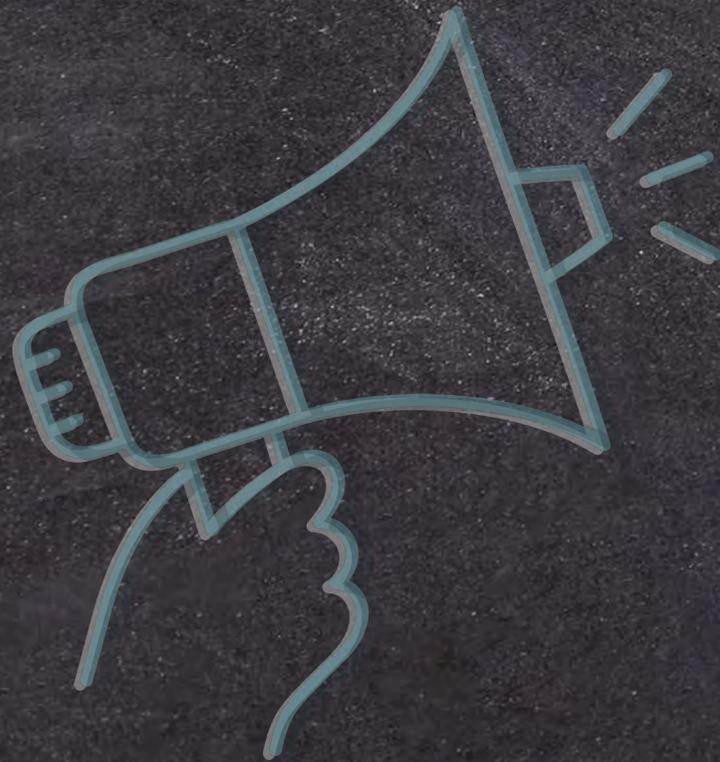
Look at our Astrophoto  
Challenge Entries

Women's Contributions

Our Solar System Inflatable  
Games

August 8

# Marketing



Word of Mouth



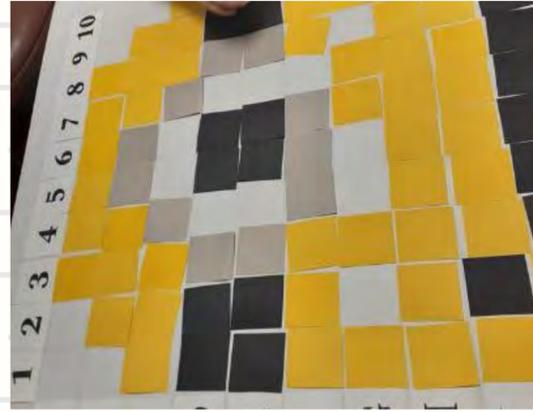
Online



Traditional



# PROJECT PLANET

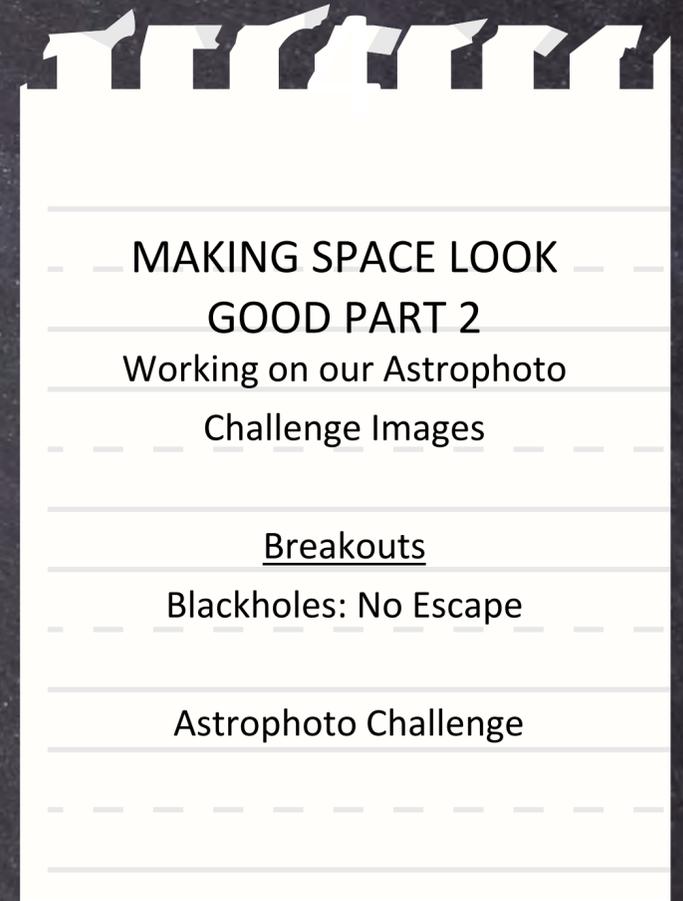


# #1 Issues

NASA's Astrophoto Challenge - Summer 2023

Begins May 15

Ends July 31



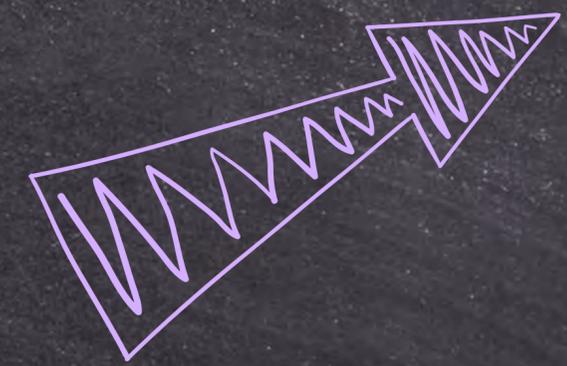
MAKING SPACE LOOK GOOD PART 2
Working on our Astrophoto Challenge Images
<u>Breakouts</u>
Blackholes: No Escape
Astrophoto Challenge

## Session #4

## August 1

After the Deadline

No Opportunity to Work on Entries Outside Programs



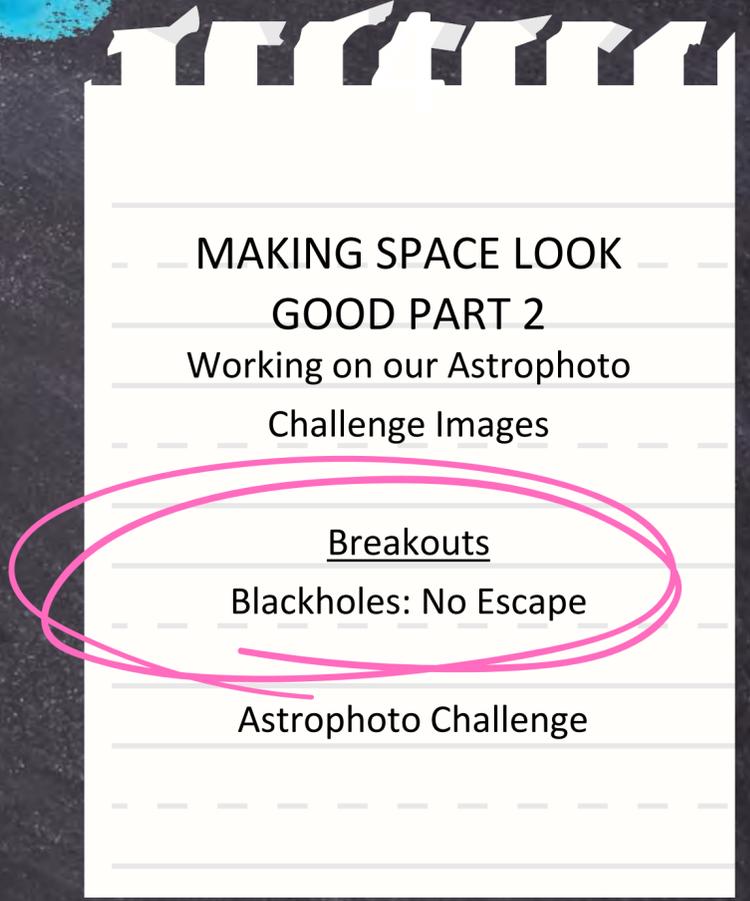


#2

# Issues



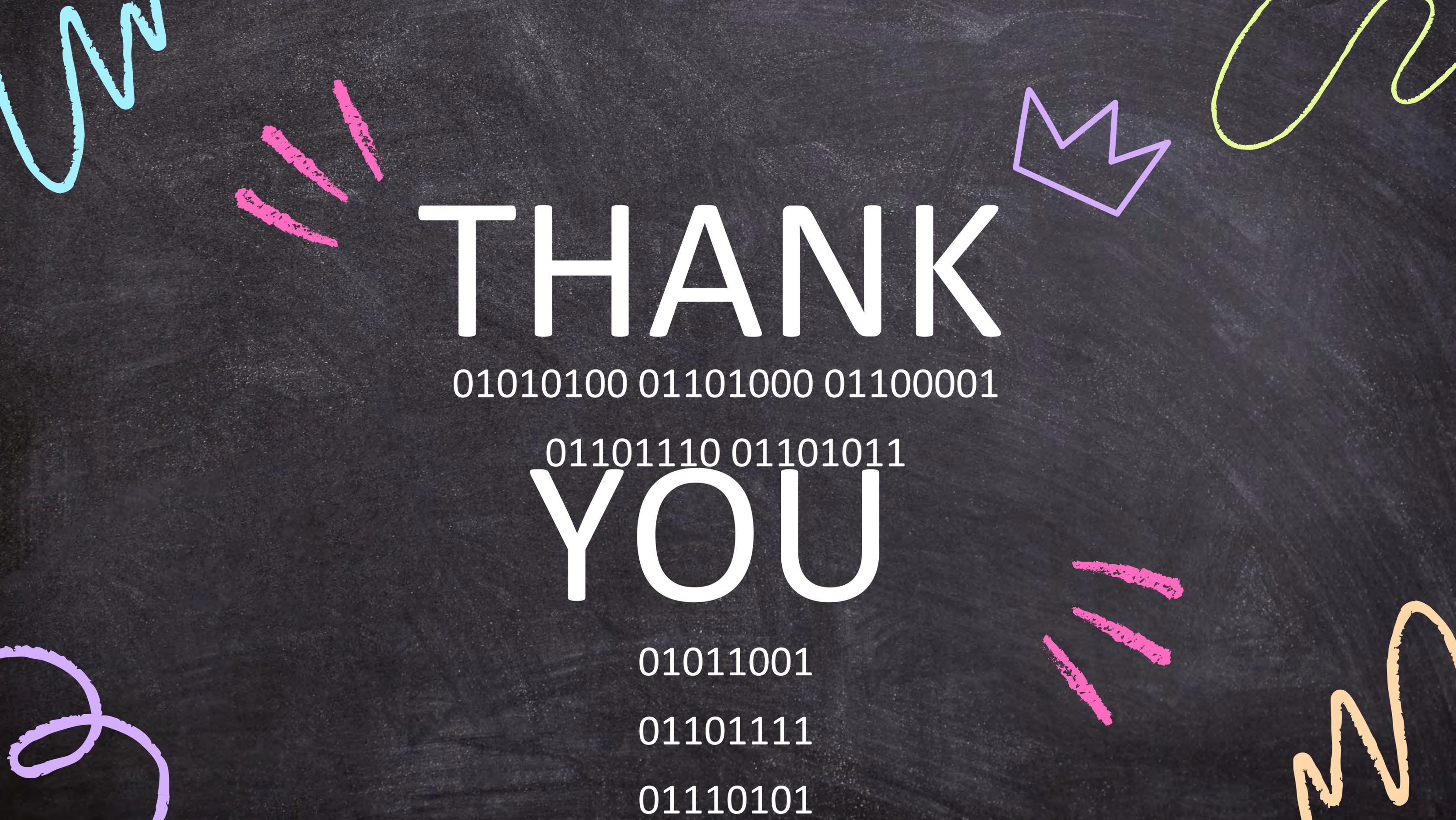
Bad Weather forced us to reschedule  
Miscommunication sent out supplies for our  
Blackholes activity to storage



## Session #4 August 1

No supplies for the Blackholes activity.  
No time or budget to purchase more.





THANK

01010100 01101000 01100001

01101110 01101011

YOU

01011001

01101111

01110101

NASA's Universe of  
Learning:  
Girls STEAM Ahead with  
NASA

Mandie Muehlhausen

Lisa Broomall

October 17, 2023

# Anna Porter Public Library

159 Mills Park Road  
Gatlinburg, TN 37738



# Introduction:

Anna Porter Public Library's

Mission:

**“Our mission is to strengthen our community through literacy and lifelong learning by providing equal access to materials for everyone. We’re not only a place to come and read - we’re a center for discovery, creativity, and empowerment.”**

## Anna Porter Public Library

"Send me your books, for the children of Gatlinburg have nothing to read."-  
Anna Porter, 1932

- Over 4,805 people have library cards in the community.
- 639 of those cards belong to children.
- Since last June; 100 more children have received library cards, a significant growth over last year.

ANNA PORTER PUBLIC LIBRARY

## Getting to Know Our Community:

- Founded in 1806.
- We are located in Eastern Tennessee.
- Year-round population is 3,726.
- During tourist season (March thru January) the population increases to more than 40,000.



# We are known for:

- The Smoky Mountains
- The Smoky Mountain National Park (12 million visitors every year)
  - Black Bears
- The largest Arts and Crafts Community in the U.S. with over 100 artists
- Home of Dolly Parton and birthplace of Cormac McCarthy



## binary Code:

The students learned about binary code and how spacecraft send true-color planet pictures by using only ones and zeros.

The students crafted binary code bracelets and pins . They used different color beads to spell their names.



# what's your **wavelength**?

## ULTRAVIOLET AND INFRARED LIGHT

We played  
Multiwavelength Bingo  
with the students.



This interactive activity  
allowed the students to learn  
about the cosmos and explore  
the electromagnetic spectrum  
and how we use it to  
understand stars.



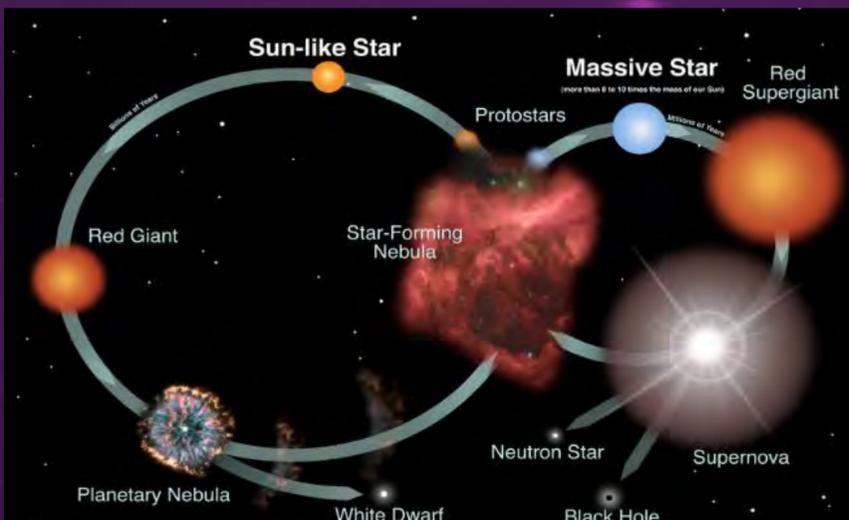
# Stellar Life Cycle:

Dr. Martha Irene Saladino was our Subject Matter Expert via zoom call and talked about the life cycle of stars.

Students were interested and engaged in what Dr. Saladino the subject matter.



Dr. Saladino was amazing and our students were very interested in the subject matter.



# Stellar Life Cycle – Bookmarkers:

Students utilized the knowledge they gained from our Subject Matter Expert and made Bookmarkers.

Each Bookmarker put a hands on approach to the information that Dr. Saladino spoke about.



# Feedback:

A student stated “I learned more in two hours than I learned all last year at school.”

Students also stated that they have more of a interest in science, astronomy, and engineering.

Students would also like more science based programs with Subject Matter Experts to come and speak to them.

# Marketing Strategies:

- We utilized social media to help spread the news about our event.
- Sent emails to the local schools informing them of our events.
  - Developed flyers and posters.
- Utilized the posters that we saw on the NASA Universe of Learning Website.

# NASA Universe of Learning-

August 17, 2023

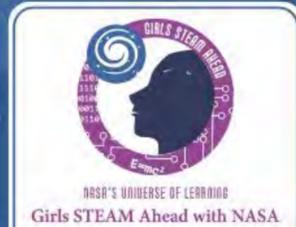
Time: 3 pm to 5 pm

Guest Speaker:

Dr. Martha Irene

Saladino

Hands-on activities and  
treats



# Marketing Strategies Continued:

## Women of Science

We used the NASA Universe of Learning posters to display various science theme books.



# Advocating for **GSAWN**:

NASA's Universe of Learning makes it simple to plan and execute programs and events using the resources available on UoL. There are unlimited resources and contacts that are available to help you plan any kind of STEAM-related program or event. Materials, ideas, and even access to the experts makes planning easy.

The majority of the activities are not complex, and require few materials, making it easy to design activities for schools, libraries, scout troops, museums, and more. The website is easy to search and use. Under the resource tab, you can search by theme, audience, type of resource, and even dates of special projects. The activity guides, printouts, and links are all provided for you. NASA couldn't have made it easier to explore our cosmos.

Thank you for this  
**wonderful**  
opportunity!

# Q & A

We'll take questions from the chat and from people using the 'hand raise' function.



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