


Libraries Helping Girls STEAM Ahead with NASA

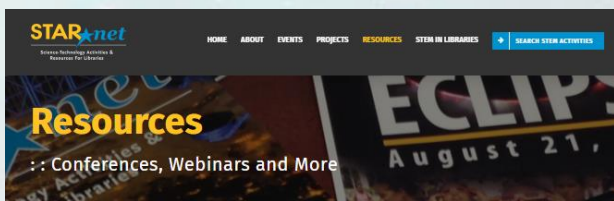
Brooks Mitchell (SSI), Emma Marcucci (STSCI), Holly Ryer (STSCI), Thalia Rivera (NASA-JPL)

The webinar will begin at 1:00 p.m. (MT) and will be recorded.



Audio problems? Click and highlight the  button at the top of your screen. You can also click “Meeting” > “Audio Setup Wizard”. You will not need microphone capabilities.

Join the STAR Library Network!



Curated Resources For Professional Development

Building the capacity of public libraries and library staff to deliver engaging, inspirational, and educational STEM programs has the potential to transform the STEM education landscape across the country. What started in libraries some years ago as independent experiments in STEM programming has become a national STEM movement.

Across the country, libraries are redefining their roles. They're becoming primary centers of informal learning, especially STEM learning. And this critical transition is being carried out by many dedicated librarians. To help them, the STAR Library Education Network (STAR_Net) is providing resources to support their efforts to develop new skills and provide quality STEM programming.

Collaboration is the key to transforming libraries into STEM learning centers



Conferences



Webinars



Newsletters



Online Forums



STAR_Net Blog



2017 Solar Eclipse



Exhibition Posters



Books, Videos & More!



Guides, Facts & Tips

Recent Blogs

Watercraft Design

The Dirt on Soil

Do You Have Your Solar Eclipse Glasses? Great - Now Try Them Out!

Upcoming Events

Discover NASA Exhibition (AZ)
May 2 - July 28

Summer Learning - Build a Better World
May 19 - August 21

Discover Tech Exhibition (CO)
May 19 - August 20

[View All Events](#)

Professional development resources, including webinars, newsletters, blogs, forums, videos, and much more!

Upcoming Webinars

A Universe of NASA Resources

Wednesday, June 6 at 1:00 p.m. MDT

[Register Here](#)

August Webinars

- International Observe the Moon Night
- Lights on Afterschool
- More to Come!

Headed to ALA? Come See Us!

- **NASA Booth #1839 – Hyperwall talks, swag, and more!**
- **STEM Opportunities, Resources, and Partnerships between Public Libraries and Afterschool Providers**
 - Saturday, June 23; 1:00-2:00 p.m.; Room 288
- **Tech-time Fun with Real-world Connections**
 - Saturday, June 23; 2:30-3:30 p.m.; Room 386-387
- **Lessons Learned from the 2017 Eclipse: What Participation in Charismatic Events Can Do For Your Library**
 - Monday, June 25; 2:30-3:30 p.m.; Room 395-396

STEM ACTIVITY Clearinghouse

For example:
[DIY Sun Cookies](#)

The screenshot shows the STEM Activity Clearinghouse interface. At the top, it features the NASA@ My Library logo, a search bar, and logos for STARnet (Science Technology Activities & Resources For Libraries) and Cornerstones of Science (awakening curiosity, enriching lives). The main content area is titled '2017 TOTAL SOLAR ECLIPSE' and indicates 'There are 7 items'. On the left, there are filter menus for 'Content Area' (Earth Science, Astronomy and Space, Chemistry, Physics, Engineering, Mathematics, Technology and Computing, Health Science), 'Age Group' (Family, Infant, Pre-K, Early Elementary, Upper Elementary, Tweens, Teens, Adults), and 'Time to Complete Activity' (Under 10 minutes, 10-20 minutes, 20-40 minutes, 40 minutes to 1 hour, 1-2 hours, 2-4 hours, Long Duration). The main list shows two activities: 'How Big, How Far, How Hot, How Old?' and 'How Can the Little Moon Hide the Giant Sun?'. Each activity entry includes a thumbnail image, a title, a brief description, an 'Open Activity' button, and a 'View Details' button. The activity details for 'How Big, How Far, How Hot, How Old?' specify a content area of Earth Science and Astronomy and Space, an age group of Family, Upper Elementary, and Tweens (9-12), a time to complete activity of 10-20 minutes, and a difficulty level of Medium.



Like an activity and think other library staff should know how great it is? Didn't like an activity or have modifications to make it better? **Make sure to leave a review!**

New Clearinghouse Feature



Solar Energy

Two bottles -- one painted black, the other painted white -- are covered with balloons and placed in bright sunlight.

[Open Activity](#)

[Write a review](#)

[Tweet](#)

[Share](#)

[Google+](#)

[Pinterest](#)

[Send to a friend](#)

[Print](#)

Content Area

Astronomy and Space

Physics

Engineering

Age Group

Upper Elementary

Tweens (9-12)

Time to Complete Activity

10-20 minutes

Time needed to prep Activity

Under 5 minutes

Cost associated with Activity Materials

\$1-\$5

Difficulty Level (by content)

Medium

Mess Level

Low

STEM Tools

Optional

[Report a broken link](#)

[Categorized Incorrectly? Let us know!](#)

RELATED PROGRAMMING RESOURCES

[Add a Tech Twist](#)

Try using an infrared thermometer or even an infrared camera to visualize the different temperatures.

Parker Solar Probe Launch

- Launch Window: 7/31 – 8/19
- Webinar Recording:
<https://youtu.be/sDxLuIYT2-s>
- Event Page:
<http://www.starnetlibraries.org/parker-solar-probe/>
- Clearinghouse Sun Activities:
<http://clearinghouse.starnetlibraries.org/124-sun>



Today's Speakers



Emma Marcucci

Education and Outreach Scientist at
Space Telescope Science Institute



Thalia Rivera

Public Engagement Specialist
for NASA's Exoplanet
Exploration Program



Holly Ryer

Senior Education Specialist at
Space Telescope Science Institute

Today's Speakers



Dr. Emma Marcucci is an Education and Outreach Scientist at the Space Telescope Science Institute. She received her Ph.D. in planetary geology from the University of Colorado at Boulder in 2013. As a Postdoctoral Fellow, she worked with satellite stereo images to make topographic models of locations that lack good elevation information, such as in Alaska and on Mars and Mercury. Dr. Marcucci is now part of the Office of Public Outreach at STScI sharing the science of the Hubble and James Webb Space Telescopes with the general public and supporting informal learning of NASA astrophysics content as a member of the NASA's Universe of Learning.

Emma Marcucci

Education and Outreach Scientist at
Space Telescope Science Institute

Girls STEAM Ahead with NASA



NASA'S UNIVERSE OF
LEARNING

STAR Net Webinar
May 30, 2018

Speakers:
Emma Marcucci (STScI)
Thalia Rivera (JPL)
Holly Ryer (STScI)



NASA'S UNIVERSE OF
LEARNING

**An Astrophysics STEM Informal
Learning Program funded by NASA
SMD**

*Learners of all ages and backgrounds are
engaged and immersed in exploring the
universe for themselves.*

Girls STEAM Ahead with NASA

Empower public libraries and community-based organizations to **engage girls** and their families in STEM

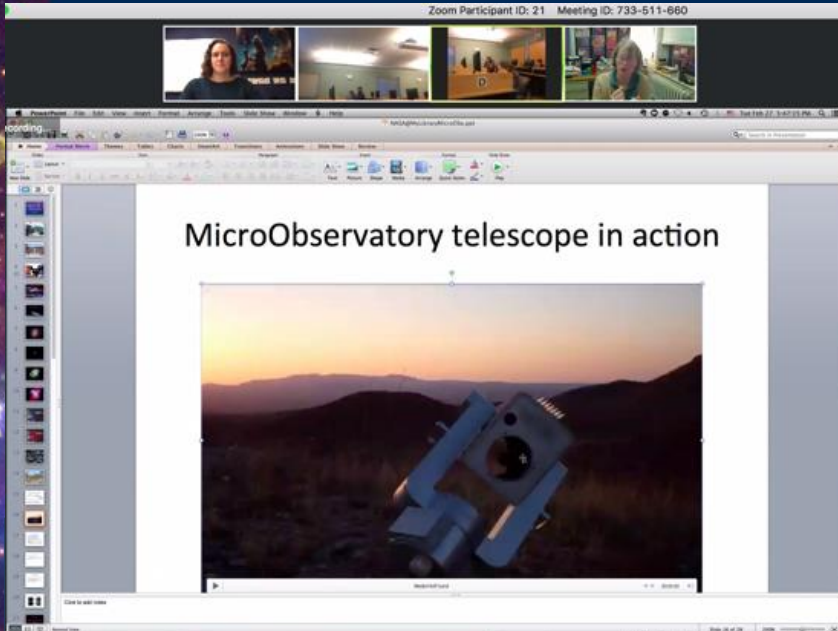


Provide accessible **exhibits, community programs, hands-on resources** that feature NASA Astrophysics science and technology

Provide **interactions with Subject Matter Experts (SMEs)**, to increase awareness of how we know what we know about our universe and to foster STEM identity.

Resources—SME Involvement

Virtual (Zoom, Skype, Google Hangouts)
In Person (select locations)



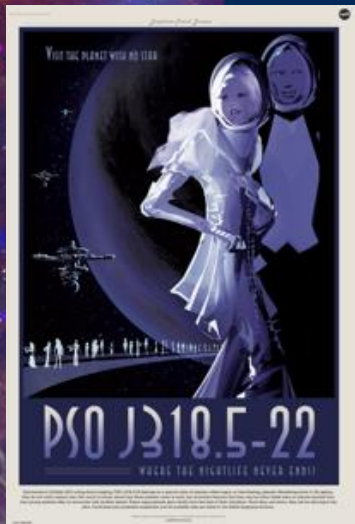
Resources—Exhibits/Posters

Exhibits

- Here, There, Everywhere
- AstrOlympics (Winter and Summer)
- Light: Beyond the Bulb
- From Earth to the Universe
- Visions of the Universe

Posters

- Women in STEM series
- Women of Color: Pioneers and Innovators
- Exoplanet Travel Posters



Some translated to Spanish, Portuguese, German

Supplemental information available

Resources—STEM Activities

Paper/Pen activities

- Recoloring the Universe
- Scale Models (TRAPPIST-1 and Solar System)
- Binary activities
- Tactile Universe

Computer-based activities

- Recoloring the Universe
- Observing with NASA
 - MicroObservatory
 - DIY Planet Search
- Universe in 3D
- Eyes on Exoplanets
- Exoplanet Travel Bureau

1
De-Coding Starlight Activity:
From Pixels to Images

**RECOLORING
the UNIVERSE**

The Scenario
You have just discovered a brilliant new supernova remnant using NASA's Chandra X-ray Observatory. The Director of NASA Deep Space Research has requested a report of your results in her office in 45 minutes. But, unfortunately, your computer crashed fatally while you were creating an image of the supernova remnant from the numerical data and you also lost a small amount of back up data. To fix the situation you will create, by hand, an image of the supernova remnant.

To do so, you will use raw (or unprocessed) data from the Chandra satellite. Additionally, you will prepare a written explanation of your discovery and answer a few of the Director's questions.

Barred Spiral Galaxy (detail)

Thermal output (detail)

Binary Pins
This activity will allow you to write your initials in binary code to create beaded pins.

15 min



Observing with NASA (microobservatory.org)

MicroObservatory Robotic Telescope Network

Explore the Universe with telescopes you control over the internet!

Welcome to the MicroObservatory Robotic Telescope Network operated by the Harvard-Smithsonian Center for Astrophysics.

Follow Us

MicroObservatory Access Portals

- OBSERVING WITH NASA: MicroObservatory for everyone!
- LEARNING FOR THE STUDY OF ASTRONOMY: Explore exoplanets for students and teachers!
- MicroObservatory Beta 1.0: Full access legacy portal. Login required.
- DIY Planet Search: Beta Version.

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Demonstration of Selected Resources

Exoplanet Travel Bureau (<https://exoplanets.nasa.gov/alien-worlds/exoplanet-travel-bureau/>)



 TRAPPIST 1A (star)	 TRAPPIST 1b (non-habitable zone)	 TRAPPIST 1c (non-habitable zone)	 TRAPPIST 1d (non-habitable zone)
 TRAPPIST 1e (habitable zone)	 TRAPPIST 1f (habitable zone)	 TRAPPIST 1g (habitable zone)	 TRAPPIST 1h (non-habitable zone)

Eyes on Exoplanets

(<https://eyes.jpl.nasa.gov/eyes-on-exoplanets.html>)

EXPLORE

About the Planet

ROCKY PLANET

Name: Kepler-11 c
Planet type: Super Earth
Discovery date: 2010
Mass: 2.9 x Earth
Planet radius: 0.256 Jupiters

Orbital radius: 0.11 AU
Orbital period: 13 days
Eccentricity: 0.008
Method of Detection: Transit

PLANET VIEW | PLANETARY SYSTEM VIEW

HOW LONG TO TRAVEL HERE? | COMPARE WITH OUR SOLAR SYSTEM

HABITABLE ZONE | COMPARE SIZE

Binary activities <http://chandra.si.edu/binary/>

Binary Bracelet

Embed your name or nickname in a beaded binary code bracelet.

Scale Models

https://media.universe-of-learning.org/documents/UoL_TR_APPIST_Scale_Model-2018-02.pdf

Today's Speakers

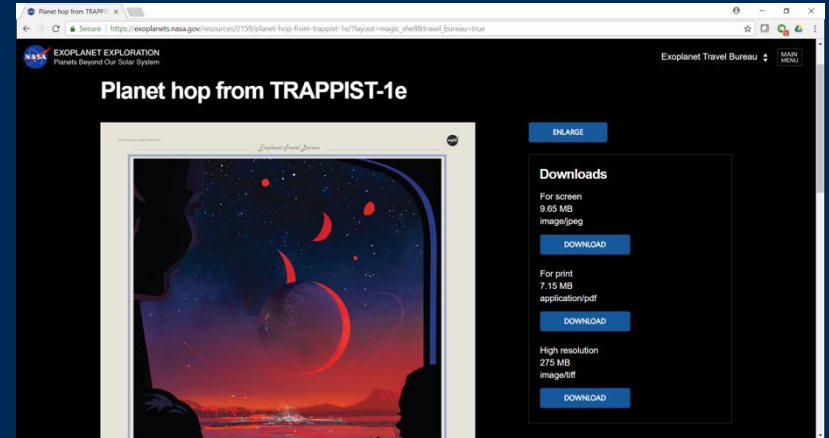
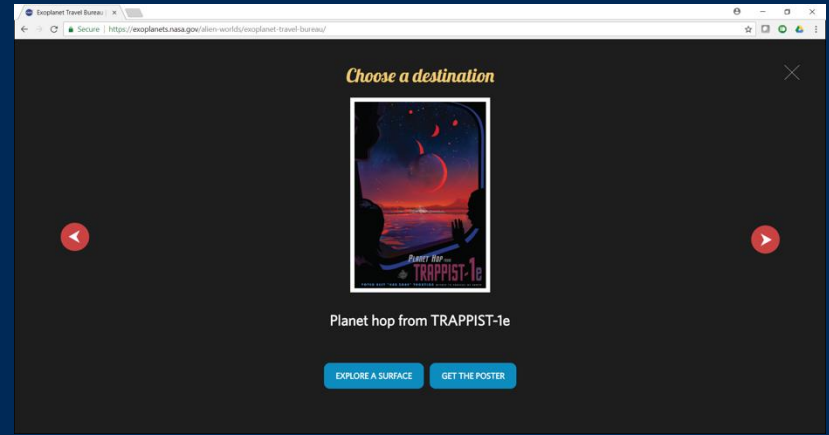
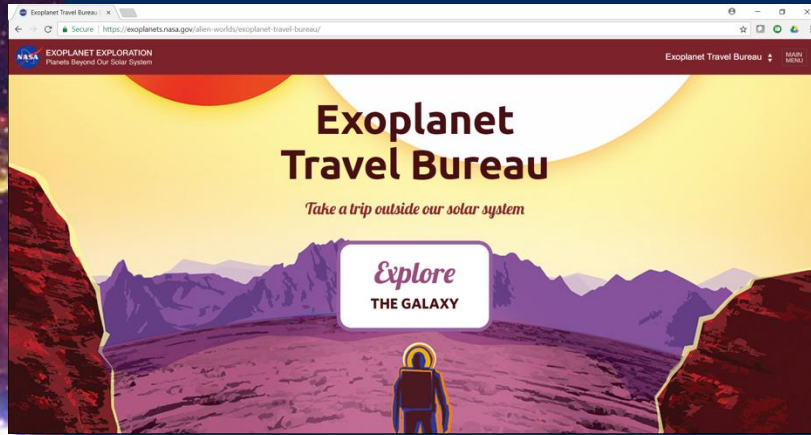


Thalia Rivera is a Public Engagement Specialist for NASA's Exoplanet Exploration program. She works on public engagement by coordinating and managing outreach events such as "A Ticket to Explore JPL," American Astronomical Society conferences, and other general public events and scientific conferences. She develops and assists in creating informative materials for distribution to the public and science community. These events and materials help make the science of exoplanet exploration relatable, accessible, and exciting to those who may be unfamiliar with current NASA Exoplanet missions and research. Ms. Rivera has a bachelor's degree in Speech Communications from the University of La Verne

Thalia Rivera

Public Engagement Specialist
for NASA's Exoplanet
Exploration Program

Exoplanet Travel Bureau



Eyes on Exoplanets

Eyes full version - <https://eyes.jpl.nasa.gov/eyes-on-exoplanets.html>

Explore the Surface - Kep x NASA's Eyes: Eyes on Exo x

NASA Jet Propulsion Laboratory [US] | <https://eyes.jpl.nasa.gov/eyes-on-exoplanets.html>

NASA's Eyes

Eyes on Exoplanets

About the Planet

ROCKY PLANET

Name: Kepler-11 c
Planet type: Super Earth
Discovery date: 2010
Mass: 2.2 x Earth
Planet radius: 0.295 Jupiters

Orbital radius: 0.11 AU
Orbital period: 13 days
Eccentricity: 0.05
Method of Detection: Transit

PLANET VIEW PLANETARY SYSTEM VIEW
HOW LONG TO TRAVEL HERE? COMPARE WITH OUR SOLAR SYSTEM
HABITABLE ZONE COMPARE SIZE

Get Started

NASA's Eyes interactives require a one-time download of the app.

[DOWNLOAD APP](#)

Already have the app?
Launch and start exploring!

[LAUNCH](#)

Get set for launch. "Eyes on Exoplanets" will fly you to any planet you wish—as long as it's far beyond our solar system. This fully rendered 3D universe is scientifically accurate, allowing you to zoom in for a close look at more than 1,000 exotic planets known to orbit distant stars.



Emma Marcucci

Education and Outreach Scientist at
Space Telescope Science Institute

Today's Speakers



Holly Ryer

Senior Education Specialist at
Space Telescope Science Institute

Holly Ryer is a Senior Education Specialist at the Space Telescope Science Institute (STScI) in Baltimore, Maryland. As a member of the Science Communications and Engagement team, Holly supports the NASA-funded “Universe of Learning” informal education program. She is responsible for the development and assessment of inquiry-based learning approaches and partnership building for projects such as Girls STEAM Ahead with NASA. She also supports NASA reporting and program evaluation activities and communication activities for the Hubble Space Telescope mission. Holly is a former classroom teacher with eight and a half years’ experience teaching in Baltimore-area schools. During that time, she served on various committees, developed district-level curriculum, and participated in the scoring of the Maryland State Performance Assessment Program. Now, Holly takes great pleasure in supporting NASA education and outreach efforts.

The Good...

- The number of women in science and engineering is growing. Except in computer/mathematical sciences, women have increased their proportion in each broad occupational group since the early 1990s.
- Girls are performing as well as or better than boys as measured by standardized test performance and their high school grade point averages in science and math. They also are earning high school math and science credits at the same rate as boys (U.S. Department of Education, National Center for Education Statistics, 2007) (NSF, Science & Engineering Indicators, 2016).
- Promising – Preliminary findings show that girls' interest in math and science does not drop during middle school as indicated in past research, but remains high. (Generation STEM: A report from the Girl Scout Research Institute, 2012).



The Bad...

- Women with college degrees remain underrepresented in science and engineering occupations. Women make up half of the total U.S. college-educated workforce, but only 29% of the science and engineering workforce.
- Women who do earn degrees in these fields leave those professions at much higher rates than men. And the women who graduate with degrees in engineering and computer science are less likely to be employed than men.



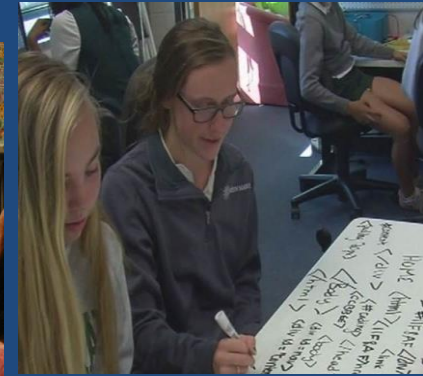
The Ugly...

- Three quarters of middle school girls show strong interest in science and math, yet only a tenth will go on to continue their studies in college.
- When making choices about their majors and careers, many young women rule out STEM partly because of interests, feeling ill-prepared for them, or because society identifies these domains as male.



Increasing the Good!

Research suggests that math and science out-of-school activities are positively associated with youths' interest in science and self-concept of abilities in these subject areas.



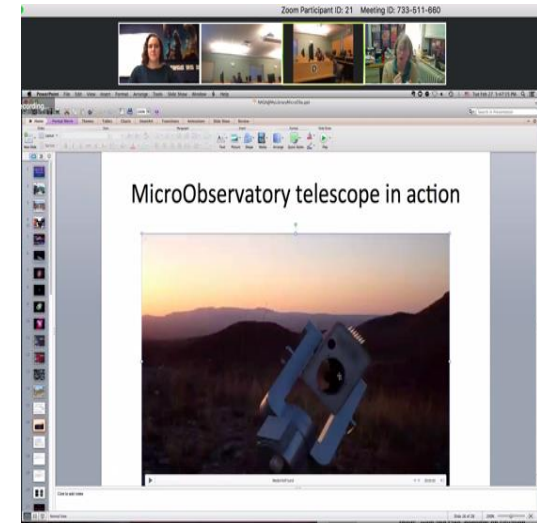
Girls who participate in STEM clubs and activities outside of school are more likely to say they will pursue STEM subjects later in their education.

Increasing the Good: Strategies & Best Practices

- **Low Pressure:** Emphasize learning something new and having fun. Support youth in trying, exploring, and making mistakes without judgement.
- **Student-centered:** Ask youth to make predictions, decide for themselves what the activity is about and what they would like to learn, and use activities that are open-ended in nature.
- **Emphasize process (not just product):** Encourage youth to make reasoned conjectures about problems, to explore varied approaches to tasks, and to explain and justify their work.
- **Collaborative teamwork:** Have students complete tasks in groups/teams if possible. Start with “ice breaker” activities to encourage teamwork for students who may not know one another.
- **Gender-balanced:** Create a gender-neutral, non-competitive environment. Use language and visuals inclusive of both males and females.
- **Family/parent encouragement - it makes a difference:** Include family members in STEM events. Provide resources for families to engage in STEM activities at home with their children.

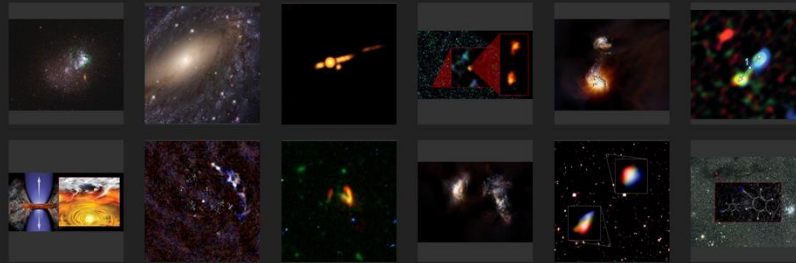
Putting it into Action: Observing with NASA

- ✓ Create your own image as a model ahead of time.
- ✓ Have students work in teams to replicate it as you walk them through the activity.
- ✓ Have teams select their own images to process from the image archive.
- ✓ Have teams explore other ways to colorize their images in addition to RGB.
- ✓ Students can print their images for a display area and/or a gallery walk during which teams explain how they created their images.
- ✓ Students can locate their image in AstroPix to see images of their object from other telescopes and make comparisons.
- ✓ Students can continue the fun by requesting other images to process and print at home or at library.

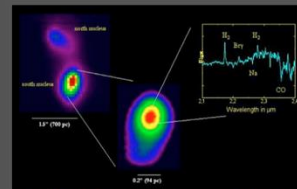


7,040 Total Images

[View Recent Additions](#)



Pulled from the Archive



SINFONI observations of NGC 6240

Getting Started

Images from telescopes around the world and in space are now at your fingertips. AstroPix is a new way to explore and share the universe.

- **Basic Search** - Type some terms into the upper right text box to do a quick search.
- **Browse by Topic** - Jump right to some common categories that showcase the AstroPix collection.
- **Advanced Search** - Create your own structured search, or modify a browse topic, to find exactly the images that interest you.

Content Providers & Partners

- NASA's Chandra X-ray Observatory
- European Southern Observatory (ESO)
- NASA's Galaxy Evolution Explorer (GALEX)
- ESA's Herschel Space Observatory via NASA Herschel Science Center
- NASA/ESA Hubble Space Telescope via STScI & ESA/Hubble
- National Radio Astronomy Observatory (NRAO)
- NASA's Nuclear Spectroscopic Telescope Array (NuSTAR)
- ESA's Planck Satellite via Planck U.S. Data Center
- NASA's Spitzer Space Telescope
- NASA's Wide Field Infrared Survey Explorer (WISE)

By Image Type



Observation [Q](#)



Artwork [Q](#)

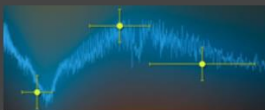
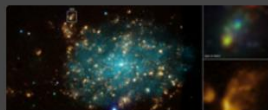


Chart [Q](#)



Collage [Q](#)

By Subject



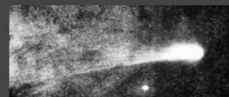
Galaxies [Q](#)



Nebulae [Q](#)



Stars [Q](#)



Comets and Asteroids [Q](#)



Baby Stars [Q](#)



Supernovae [Q](#)

By Spectral Band



X-ray [Q](#)



Ultraviolet [Q](#)



Optical [Q](#)



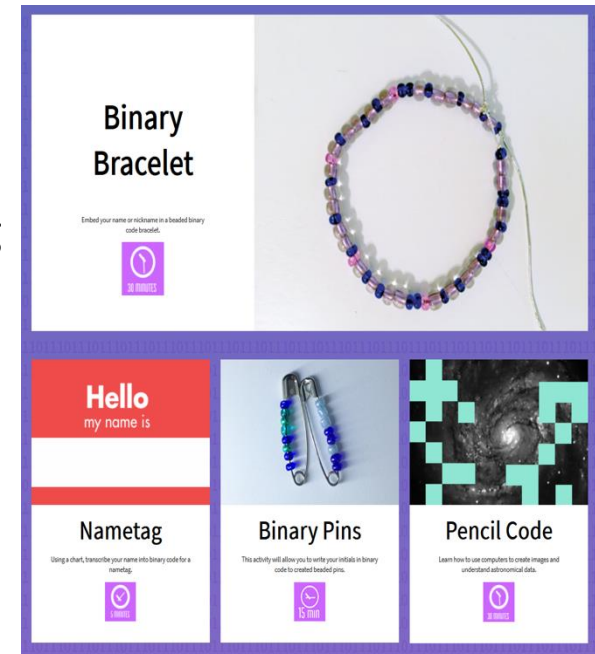
Infrared/Millimeter [Q](#)



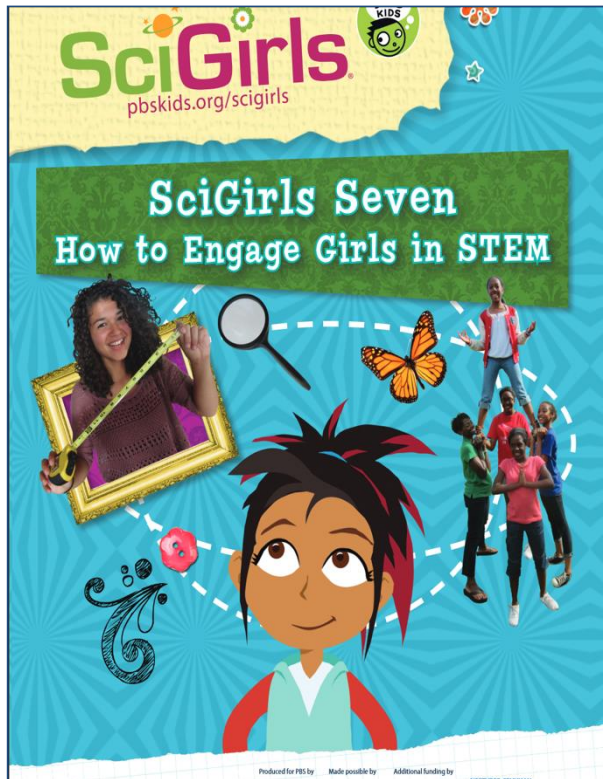
Radio [Q](#)

Putting it into Action: Binary (How to Talk to a Spacecraft)

- ✓ Activities can be used by themselves or in conjunction with Recoloring the Universe.
- ✓ One option is to create activity stations/work areas for each binary activity.
- ✓ Have students work in teams to select a project of their choice, or rotate through the stations to try each one.
- ✓ As a follow-on, have students create words or messages and translate them into binary using the code chart.
- ✓ Teams can exchange messages and “decode” them.
- ✓ Students can continue the fun by using Recoloring the Universe at home or at the library.



Strategies & Best Practices: Resources



<http://www.scigirlsconnect.org/scigirls/>

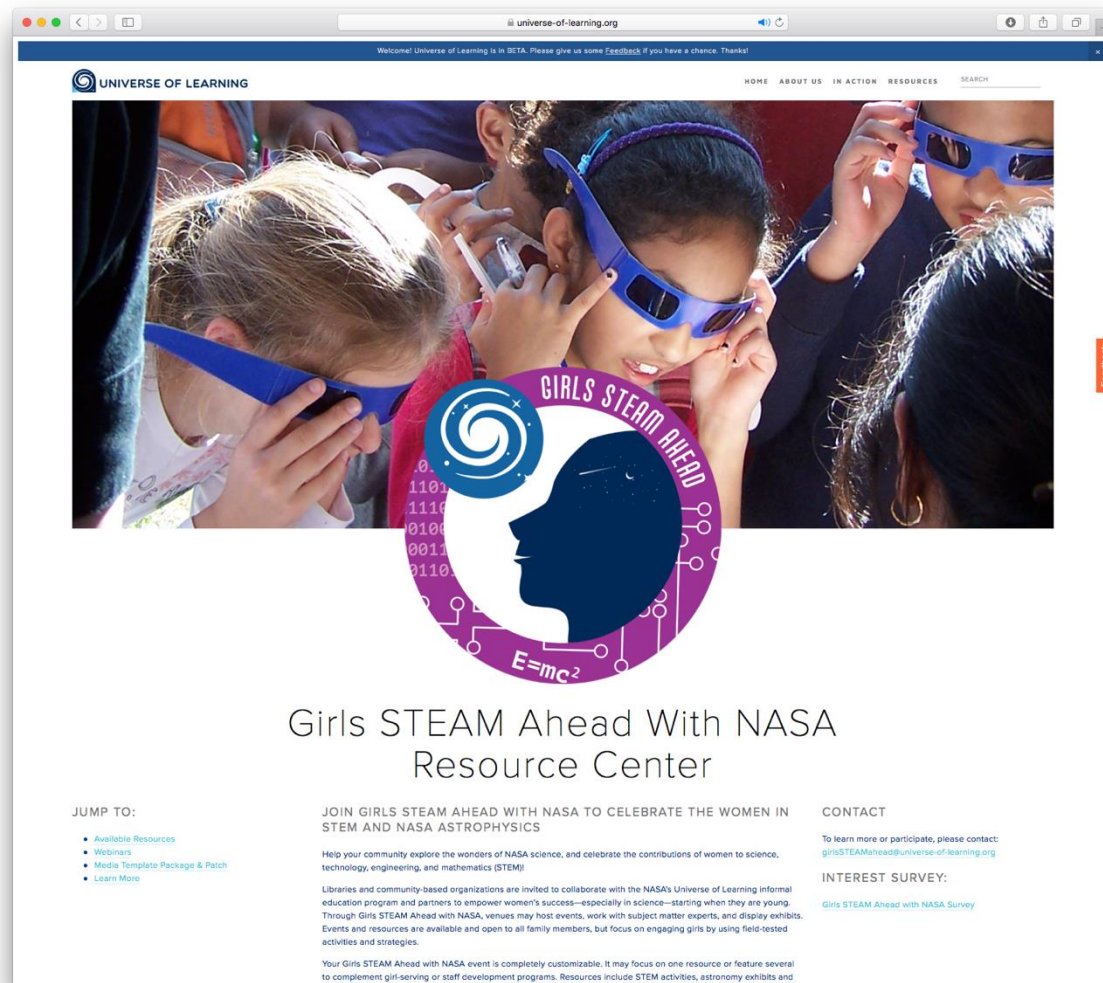
A screenshot of the National Girls Collaborative Project website. The header includes the project name, a search bar, and navigation links: 'ABOUT', 'GET INVOLVED', 'PROGRAM DIRECTORY', 'EVENTS', 'RESOURCES', 'BLOG', 'GLOBAL', and 'DONATE'. Below the header is a banner image of four girls. The main content area is titled 'Resources' and features a list of links: 'Mini-Grants', 'Newsletter Archive', 'Webinars', 'Statistics', 'Brochure', 'Exemplary Practices', 'Access and Equity', 'Collaboration', 'Evaluation & Assessment', and 'Relevant Links'. The 'Exemplary Practices' section is highlighted and contains the following items:

- Engaging Girls in STEM**: Exemplary Practice Research on Engaging Girls in STEM. The following publications summarize research focused on what works to engage and support girls in STEM. These publications present new research or distill existing research and provide it in user-friendly formats to inform programming, reference in presentations, and cite when writing proposals or seeking other types of program support.
- APEC Women in STEM (2016)**: The APEC Women in STEM: A Framework for Dialogue, Learning, and Action report is endorsed by the Asia-Pacific Economic Cooperation (APEC) Policy Partnership on Women and the Economy. This report provides a framework that organizes challenges and opportunities in engaging girls in STEM across four key issues: enabling environment, education, employment, and entrepreneurship. The report highlights emerging practices in the Asia-Pacific region in all four pillars and makes concrete recommendations on ways that stakeholders can work together to strengthen STEM education and related career pathways for women.
- The SciGirls Seven**: The SciGirls PBS television series, website, and outreach initiatives emphasize current research on strategies proven to increase girls' engagement in STEM. A quarter of a century of studies have converged on a set of common strategies that work, and these have become SciGirls' foundation. The SciGirls Seven summarizes seven research-based strategies for engaging girls in STEM, including tips for putting these strategies to practice and references for additional information.
- Solving the Equation: The Variables for Women's Success in Engineering and Computing (2015)**: This research report, published by AAUW, asks why there are still so few women in the critical fields of engineering and computing -- and explains what we can do to make these fields open to and desirable for all employees. A PowerPoint presentation and fact sheet are also available.
- Girls in IT: The Facts (2013)**: This report, sponsored by the National Center for Women & Information Technology's K-12 Alliance, summarizes the existing literature on girls' participation in computing, including key barriers to girls' participation and promising practices for addressing these barriers.
- Effective STEM Programs for Adolescent Girls: Three Approaches and Many Lessons Learned (2013)**: This article, published in Afterschool Matters, describes three successful programs to engage adolescent girls in STEM: Techbridge, Girls Go Techbridge, and Access for Young Women. Effective strategies implemented by the programs include developing collaborations, creating an engaging and relevant curriculum, and inspiring career exploration.
- Cascading Influences: Long-Term Impacts of Informal STEM Experiences for Girls (2013)**: This report, by Dale McCreedy and Lynn D. Dierking, summarizes National Science Foundation-funded research that investigated whether girls-only, informal STEM experiences have long-term influences on young women's lives. The authors present key findings of the study, barriers to success that were identified, and recommendations for informal STEM educators.

<https://ngcproject.org/engaging-girls-in-stem>

Find more information!

http://universe-of-learning.org/girls_steam_ahead



The screenshot shows a web browser window displaying the 'UNIVERSE OF LEARNING' website. The main content area features a large photograph of three young girls wearing blue 3D-printed glasses and looking at a device. Overlaid on the photo is a circular logo with a purple and blue color scheme. The logo contains a white silhouette of a girl's head in profile, facing right. Above the silhouette is a blue spiral, and below it is the equation $E=mc^2$. The text 'GIRLS STEAM AHEAD' is written in white around the top inner edge of the circle. The website header includes navigation links: HOME, ABOUT US, IN ACTION, RESOURCES, and SEARCH. Below the main image, the text reads 'Girls STEAM Ahead With NASA Resource Center'. There are three columns of text: 'JUMP TO:' with links for 'Available Resources', 'Webinars', 'Media Template Package & Patch', and 'Learn More'; 'JOIN GIRLS STEAM AHEAD WITH NASA TO CELEBRATE THE WOMEN IN STEM AND NASA ASTROPHYSICS' with a paragraph of text; and 'CONTACT' with contact information and an 'INTEREST SURVEY:' section with a link to the survey.

Interest Survey (June 20th): <https://www.universe-of-learning.org/girls-steam-ahead-survey>

Evaluation

1. Please notify the GSAWN team (girlsSTEAMahead@universe-of-learning.org) **3 weeks prior to your event** and include:
 - Name of event and “evaluation” in your subject line
 - Contact name
 - Contact address
 - Estimated number of attendees
2. Use the evaluation forms mailed to you from Goodman Research Group.
3. Return evaluation forms in self-addressed envelope after your event.

Questions?

http://universe-of-learning.org/girls_steam_ahead
girlsSTEAMahead@universe-of-learning.org

This work supported by NASA under award number NNX16AC65A to the Space Telescope Science Institute, working in partnership with Caltech/IPAC, Jet Propulsion Laboratory, Smithsonian Astrophysical Observatory, and Sonoma State University.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Aeronautics and Space Administration.



Thank You!

Don't forget to visit:

www.starnetlibraries.org

www.clearinghouse.starnetlibraries.org

<https://www.facebook.com/STARLibraries/>

https://twitter.com/STARNet_Project