Welcome!

The Einstein's Incredible Universe Science Showcase will be starting soon.

Please introduce yourselves in the chat.

Einstein's Incredible Universe Science Showcase

August 14, 2024

NGCP Vision

The vision of the National Girls Collaborative Project is to **support and create STEM experiences that are as diverse as the world we live in.**

Our Goals

Connect + Create + Collaborate

1

Build and sustain a network of advocates to provide equitable and inclusive STEM opportunities.

2

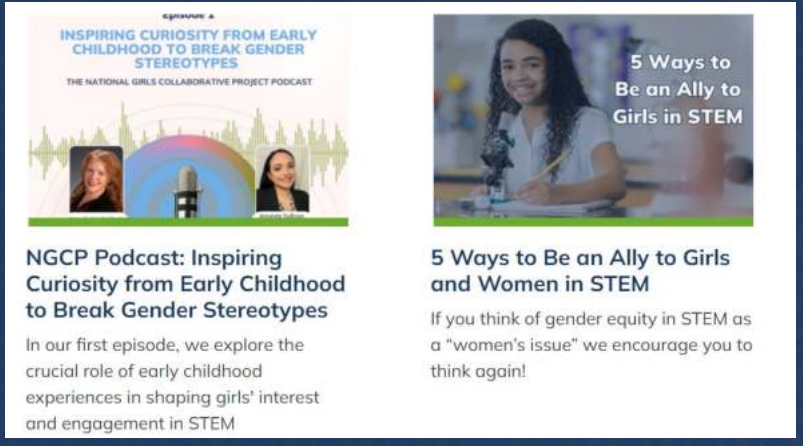
Catalyze equity in STEM from research to practice by providing actionable knowledge that transforms the STEM experience.

3

Increase our collective impact by strengthening organizational effectiveness and enhancing our fiscal sustainability.

NGCP Resources

- **National Webinars**
  - Monthly on relevant topics, speakers include educators, researchers, authors, and diverse STEM professionals
- **Monthly Newsletter**
  - National events, STEM resources for girls and youth, professional development opportunities for educators, and research and reports
- **NGCP Website**
  - Exemplary Practices pages on Engaging Girls in STEM and Access and Equity, blog posts, and statistics and research related to girls and women in STEM



Speakers

Erica Meehan

Claire Quimby

Heidi Schran

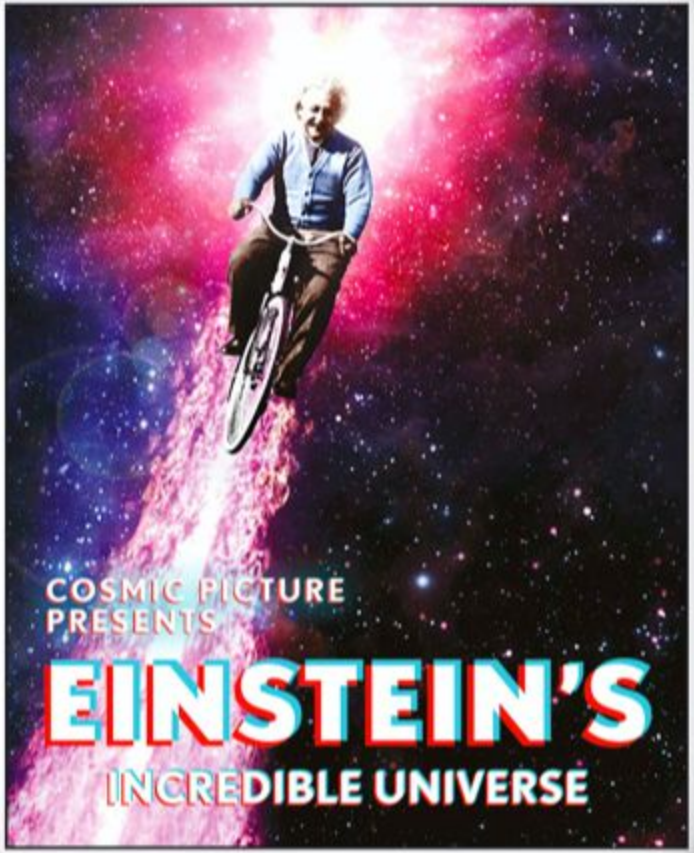
Janna Mino

Cosmic Picture awarded NSF grant for “EINSTEIN’S INCREDIBLE UNIVERSE”

National Science Foundation

New York, NY - March 9, 2023. Cosmic Picture announces that it has been awarded a $3 million grant by the National Science Foundation for its upcoming project, “EINSTEIN’S INCREDIBLE UNIVERSE.”

The project aims to engage young people and particularly girls in astrophysics through a series of hands-on experiments to be conducted over the next several years. The project includes a new giant screen film that will celebrate the creativity and legacy of Albert Einstein as told through the true stories of two astrophysicists, Andrea Ghez (2020 Nobel-laureate) and Nergis Mavalvala (Dean at the MIT School of Science). Both were inspired by Einstein as girls and are today making groundbreaking discoveries that build on and challenge some of his most radical theories.



Chicago, 1969.

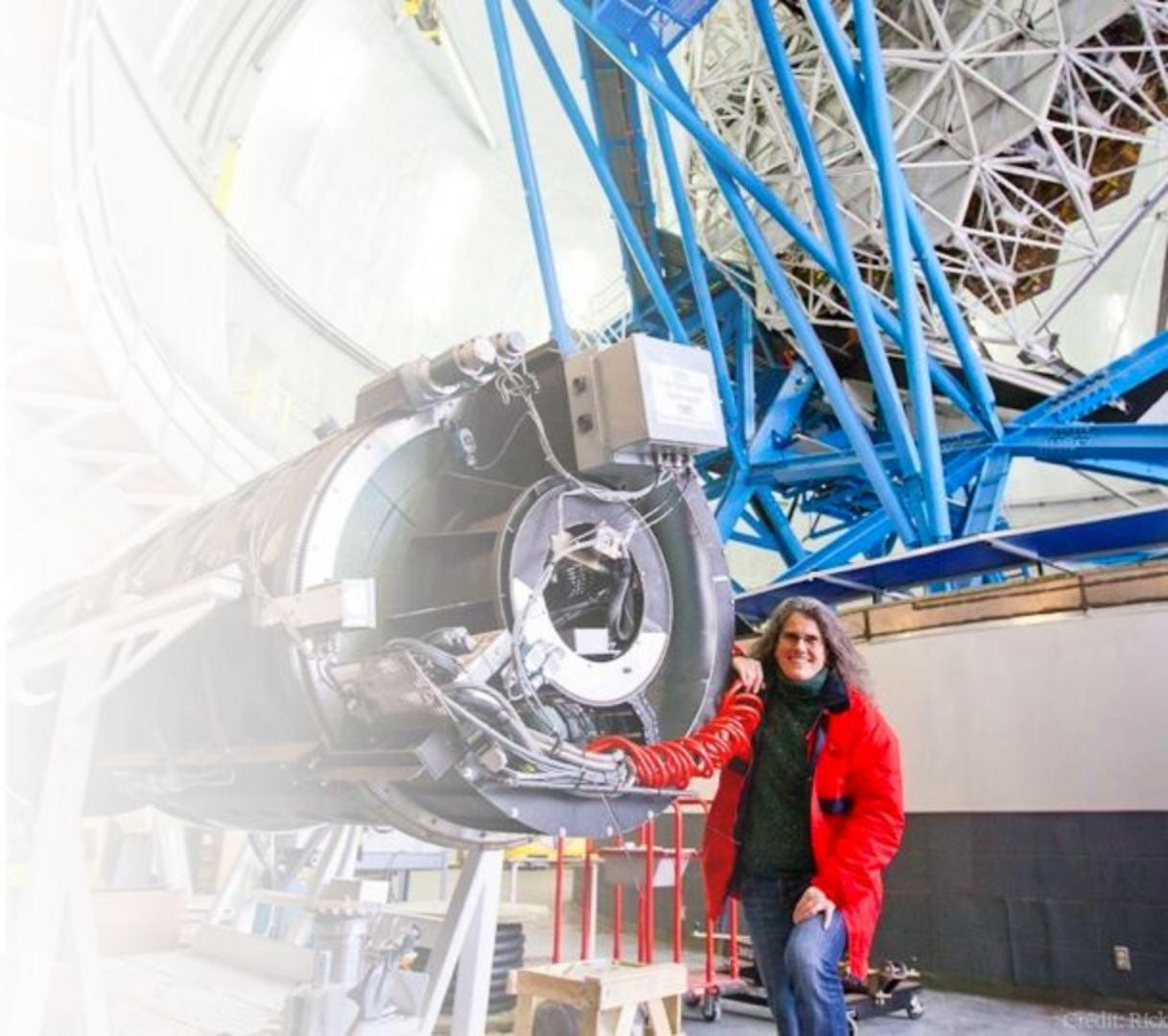
6-year-old Andrea Ghez watches the lunar landing with her parents.

Fascinated by the astronauts' apparent weightlessness, she begins to ask questions about the unseen force of gravity and perform her own thought experiments – like Einstein, using the "lab in her head" to consider radical new ideas about the nature of space and gravity.

Today, Dr. Ghez is one of the world's foremost "black hole hunters," testing Einstein's theories in places with the most extreme gravity in the known universe.

In 2020, she became the first female astrophysicist to win the Nobel Prize in Physics, for discovering a super-massive black hole at the center of the galaxy – an event during which she conducted the most comprehensive experiment ever on Einstein's theory of relativity.

She continues her pioneering research today at the UCLA Galactic Center Group and the Keck Observatory in Hawaii. She is as passionate about inspiring young women to pursue STEM interests as she is about her groundbreaking research in space science.

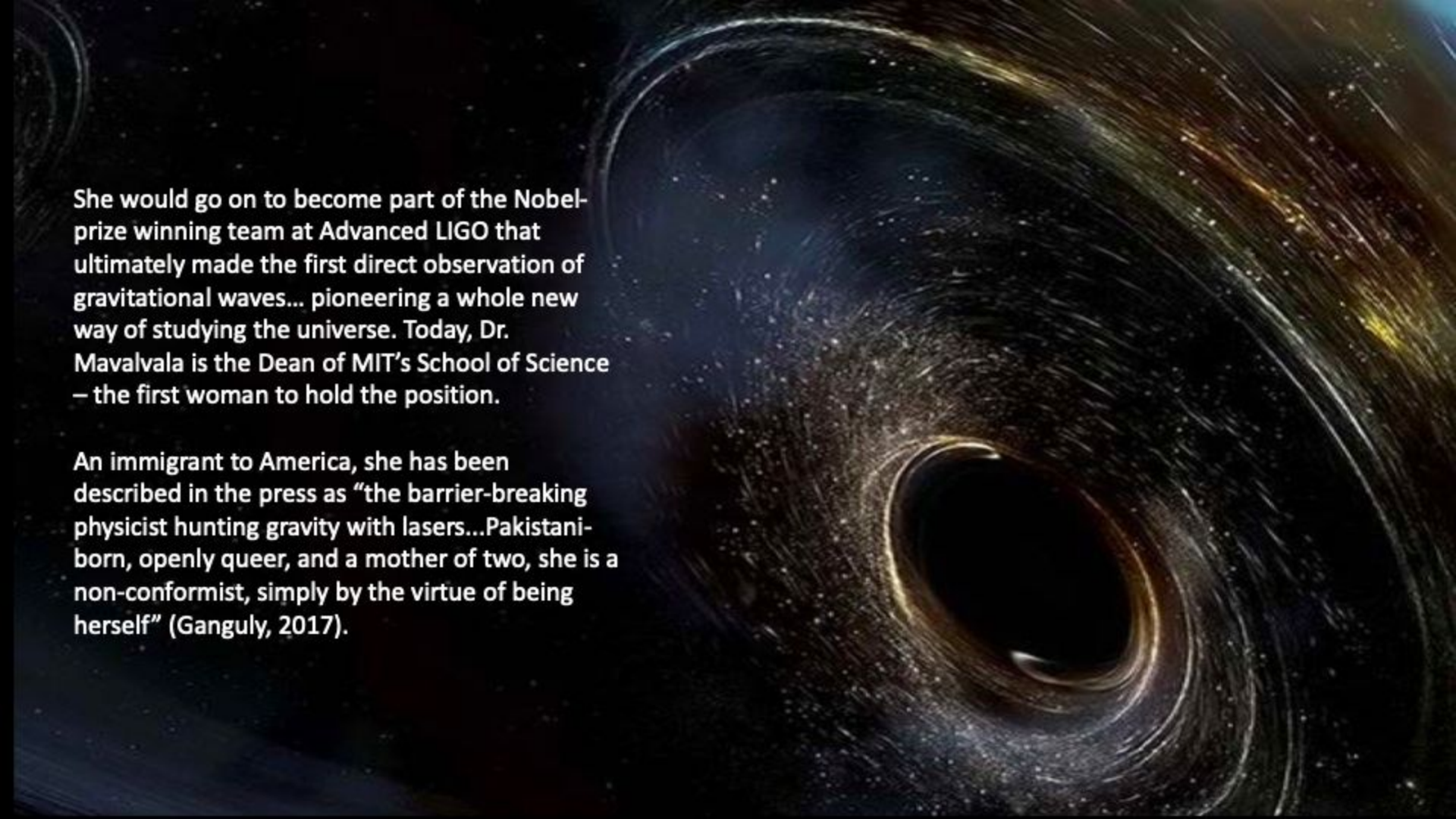



"I'm a huge believer in getting girls engaged in science at an early age, and believing in themselves...
I hope I can inspire other young women into the field. If you're passionate about science, there is so much that can be done."
-Andrea Ghez

Karachi, 1972.

9-year-old Nergis Mavalvala witnesses a summer meteor shower and she, too, becomes fascinated with the enigmatic force of gravity.

Her questions lead her on a lifelong search for gravitational waves – elusive ripples in space and time that Einstein famously predicted, but never believed could be detected by science.



She would go on to become part of the Nobel-prize winning team at Advanced LIGO that ultimately made the first direct observation of gravitational waves… pioneering a whole new way of studying the universe. Today, Dr. Mavalvala is the Dean of MIT's School of Science – the first woman to hold the position.

An immigrant to America, she has been described in the press as "the barrier-breaking physicist hunting gravity with lasers...Pakistani-born, openly queer, and a mother of two, she is a non-conformist, simply by the virtue of being herself" (Ganguly, 2017).


"I grew up in a family where the stereotypical gender roles were not really observed. So I grew up thinking women can, must and should do anything and everything. That is very important for me."
- Nergis Mavalvala

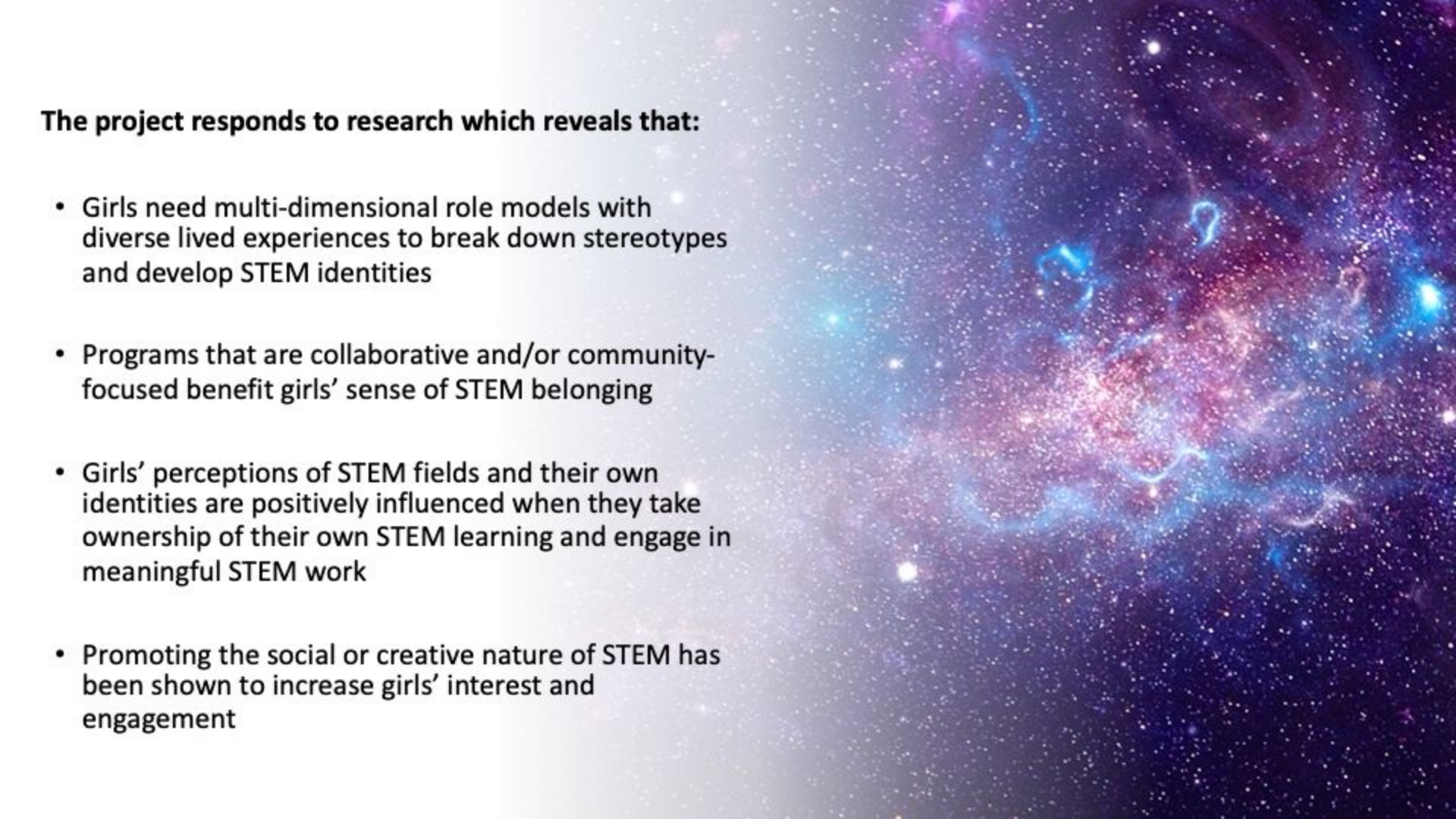
Project Goals:

- Increase scientific literacy and encourage lifelong STEM learning
- Unleash the power of curiosity and imagination; foster interest and confidence in STEM pursuits; and inspire the next generation of scientific pioneers
- Use the power of media to elevate female STEM professionals as dynamic role models and STEM ambassadors

Theory of Change

The project responds to research which reveals that:

- Girls need multi-dimensional role models with diverse lived experiences to break down stereotypes and develop STEM identities
- Programs that are collaborative and/or community-focused benefit girls' sense of STEM belonging
- Girls' perceptions of STEM fields and their own identities are positively influenced when they take ownership of their own STEM learning and engage in meaningful STEM work
- Promoting the social or creative nature of STEM has been shown to increase girls' interest and engagement



CITIZEN SCIENCE INVESTIGATIONS TIED TO THE 2024 SOLAR ECLIPSE

In collaboration with the National Girls Collaborative Project and the NASA- and NSF-funded Dynamic Eclipse Broadcast (DEB) Initiative, *Einstein's Incredible Universe* is enabling **20 teams of girls** along the path of totality to conduct coordinated solar observations during the 2024 total solar eclipse, and to broadcast images from their sites in near real-time.

Together, these girls will:

- Build STEM skills, identity and belonging
- Connect with other girls over shared experiences
- Benefit from near-peer mentoring from college-aged young women who have participated in prior work
- Connect with Drs. Andrea Ghez and Nergis Mavalvala and be inspired to explore the universe
- Contribute valuable new data to scientific understanding of the universe

GROUPS RECRUITED & SELECTED IN PARTNERSHIP WITH NATIONAL GIRLS COLLABORATIVE PROJECT

ExpERIEence Children's Museum (Erie, PA)

Girl Scouts of Western PA (Pittsburgh, PA)

Girl Scout Troop 6827 (Conway, AR)

Girlstart (Austin, TX)

Girls Inc. of Greater Indianapolis (Indianapolis, IN)

Girls Inc. of Shelbyville and Shelby County (Shelbyville, IN)

Girls STEM Institute (Indianapolis, IN)

Hathaway Brown School (Shaker Heights, OH)

Incarnate Word High School (San Antonio, TX)

Imagination Station (Toledo, OH)

Kopernik Observatory & Science Center (Vestal, NY)

Kent State University (Kent, OH)

North Little Rock Public Library System (North Little Rock, AR)

Open Doors Academy (Cleveland, OH)

Rural Community Alliance (Little Rock, AR)

STEAM Street (Dallas, TX)

Talawanda High School (Oxford, OH)

University of Arkansas System Division of Agriculture 4-H (Little Rock, AR)

Urban STEM Center at the University of Akron (Akron, OH)

DEB Initiative + Einstein Project

= Einstein program sites

= DEB initiative participants

National Girls Collaborative Project

Group leaders participated in a 3-day workshop at the Great Lakes Science Center in November 2023. They:

- received and were trained on the use of specialized telescopes, mounts, cameras, and other equipment designed to capture solar data during the upcoming total solar eclipse.
- learned best practices for supporting young women in STEM exploration.
- are now part of a community of practice committed to leading a new generation of young women in STEM pursuits.

Welcome to our Eclipse Sharing Board!

This is the place to share your journey to the 2024 solar eclipse with the Einstein's Incredible Universe Project.

Say hello and tell us what you're excited about for your projects!

Claire Quimby 2mo

Hi, I'm Claire!

Hiking with longtime friends in AZ.

I'm an education researcher, and I'm excited to see what you all are getting out of being involved in the Einstein project :)

Group

Anonymous 17d

Hello!

I am from Girl Scout Troop 6827 in Conway, Arkansas. I am looking forward to watching my girls engage with this project and I am very excited to get images of the eclipse!

♡ 3 💬 0

Add comment

Anonymous 11d

GSI Indianapolis

We're Girls STEM Institute in Indianapolis. So far both solar observations we've done have been cloudy but we're excited to photograph at the sun soon.

♡ 3 💬 1

Claire Quimby 10d
Crossing my fingers for some sunshine in Indiana soon!

Add comment

gmedrano12 3d

Hello, the IWHS Solar Sisters have been working together as a team and are "over the moon" with the progress they are making. They are looking forward to the big event in April.

Group

IWHS Solar Sisters

♡ 2 💬 0

Add comment

GENDER EQUITY STUDY & PROJECT EVALUATION

Independent research and evaluation conducted by educational research firm **Rockman et al** will assess project outcomes and impacts, including *increases in* ***scientific knowledge, interest, literacy, curiosity, confidence, and empowerment to investigate space science.***

Participants

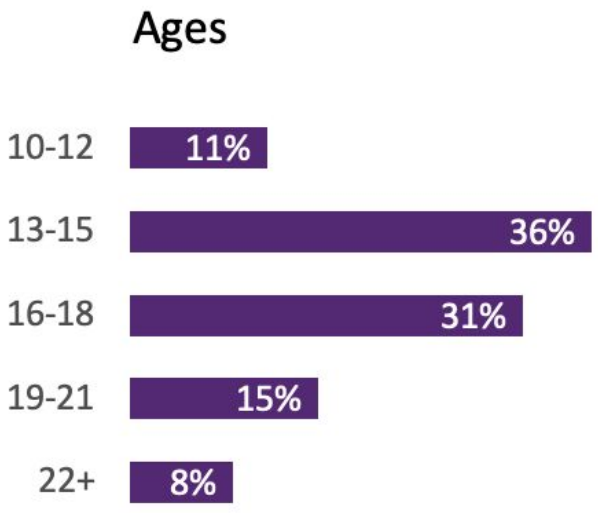
Research Questions

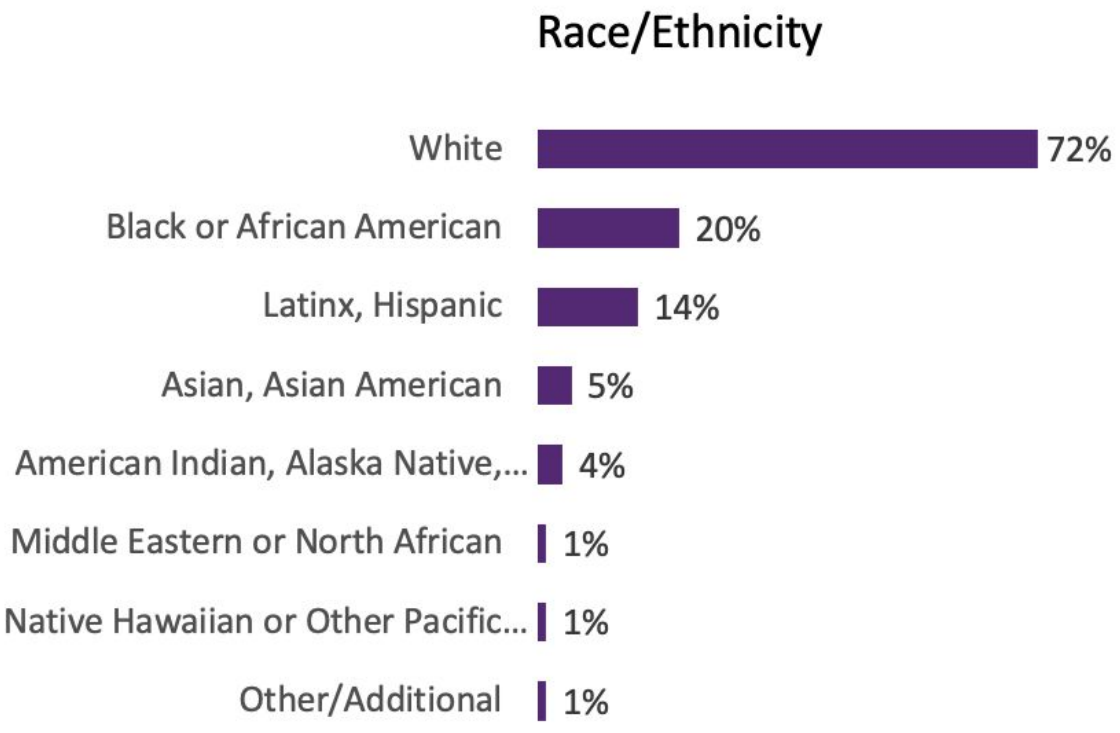
- How does participation in the Einstein Project influence girls' empowerment to investigate space science and their sense of belonging in the scientific community?
- What parts of the experience are impactful, and why?
- Where are the hurdles or barriers in the project, and how do participants and their group leaders navigate these?

Girl Scout Troop 6827

Participant Profile

Demographics



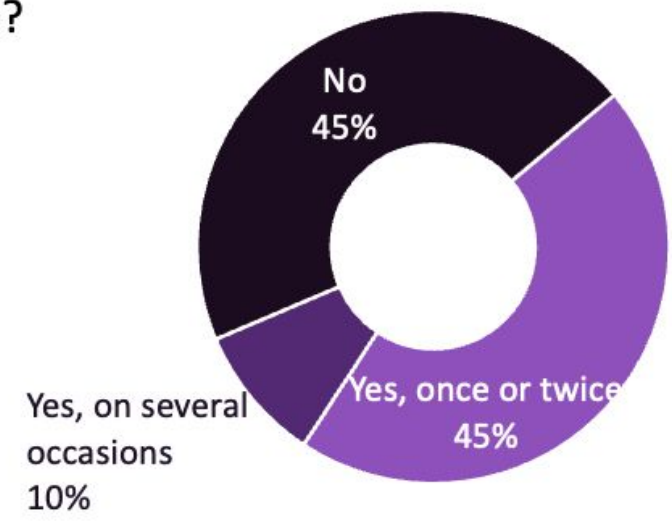


National Girls Collaborative Project

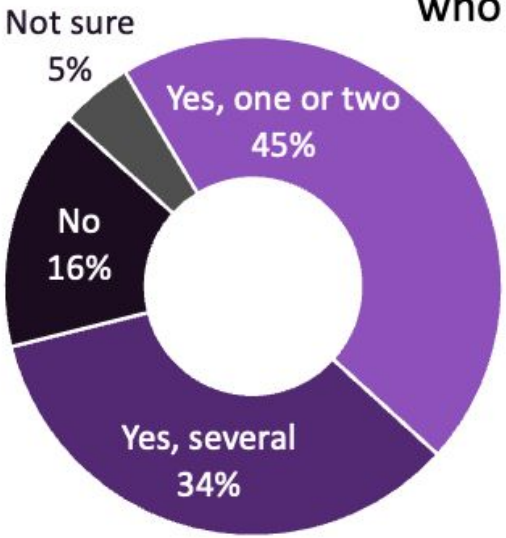
Participant Profile

STEM exposure/background

Besides school work, have you participated in a science program before?

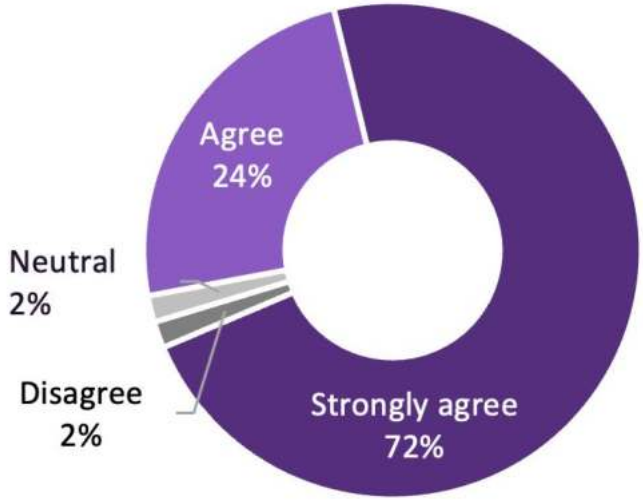


Do you know any adults who work in a STEM career?

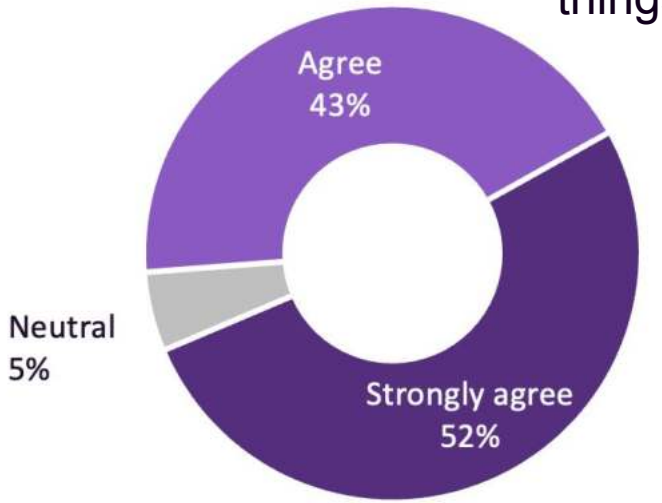


Program Impact
Overall

I would like to be a part of a project like this again.

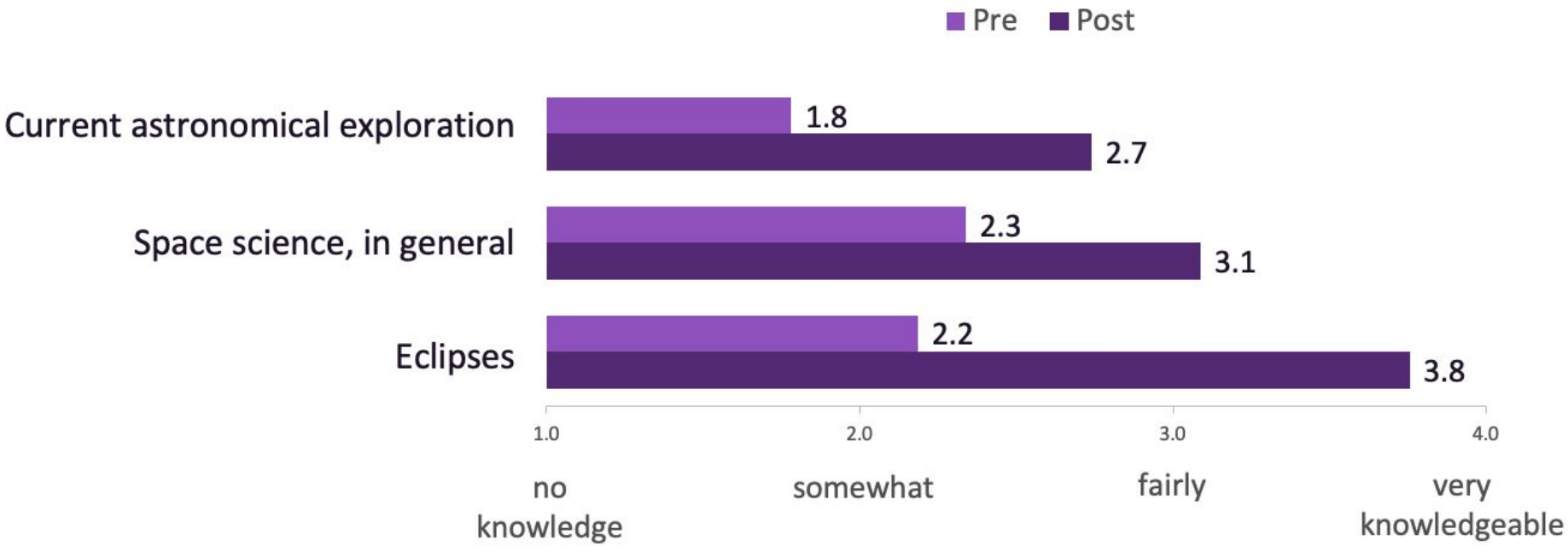


This project made me think about how I can do great things in science.



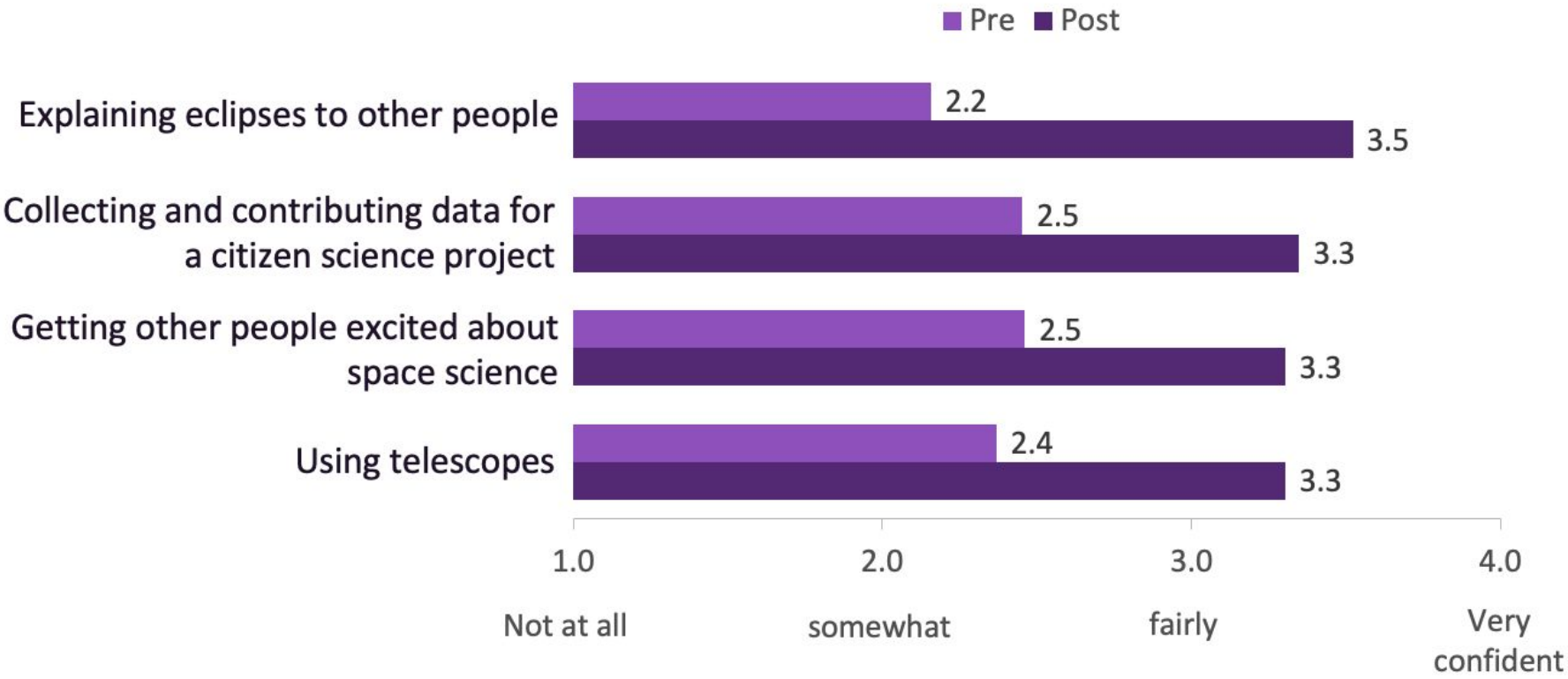
Program Impact

Science Knowledge



Program Impact

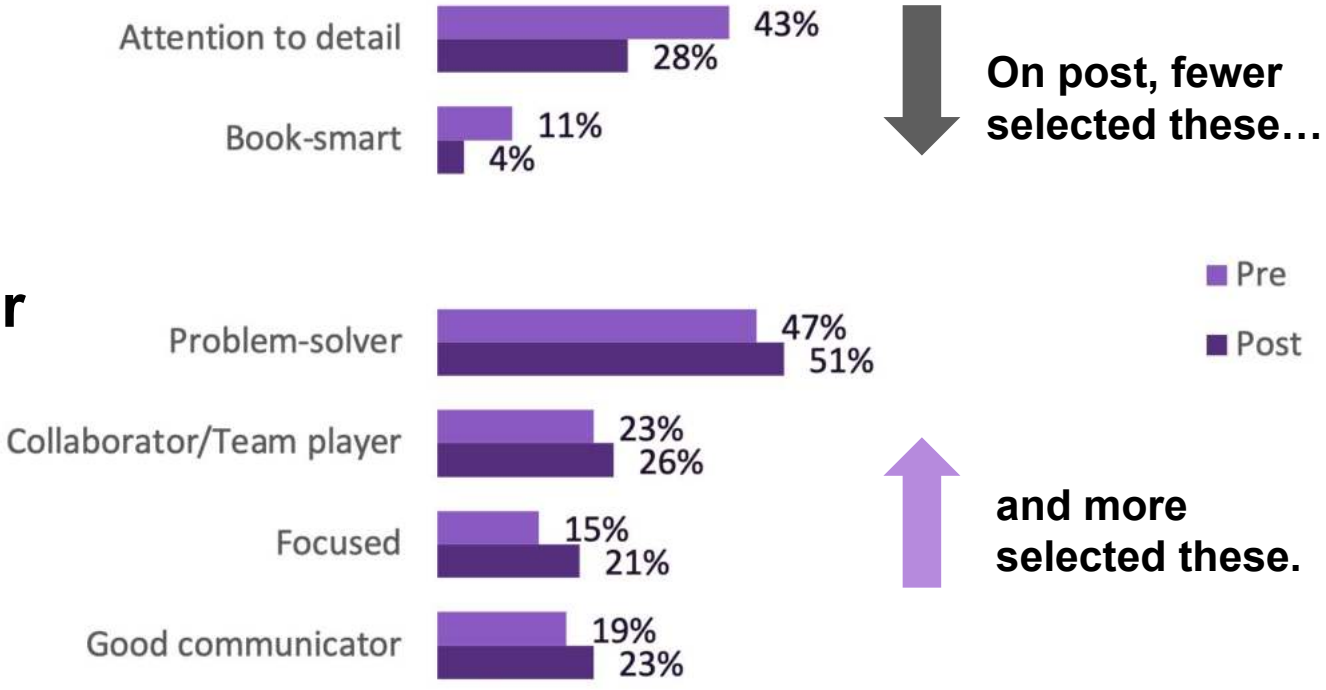
Confidence in STEM



Program Impact

Changing Understandings of Scientists

What are the most important skills or traits for scientists?



National Girls Collaborative Project

Talawanda High School and Miami University

Heidi Schran

Who We Are

Leaders
Heidi Schran, Talawanda High School Science Teacher
Joanna Hohn, Miami University STEM Outreach

Students
Seven High School Students, mixed genders
Two College Freshmen

Oxford, Ohio

Practices

Challenges:

1. Roles
2. Scheduling
3. Using Discord

Successes:

1. All Students Became Competent with the Telescope
2. Streaming Opportunity Allowed Students to Shine!

Outreach Events

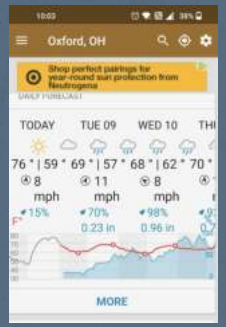
1. Lane Library
2. Second Grade Science Day
3. Uptown Oxford “Total Eclipse of the Parks”

- Students mastered their understanding of eclipses

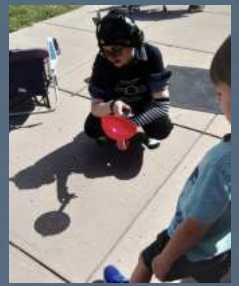
Media Coverage

1. Challenges
   - Political Concerns connected with our High School
   - Scheduling
2. Wins for the Students
   - Grant and Mission Publicity
   - Public Speaking Practice

Eclipse Day

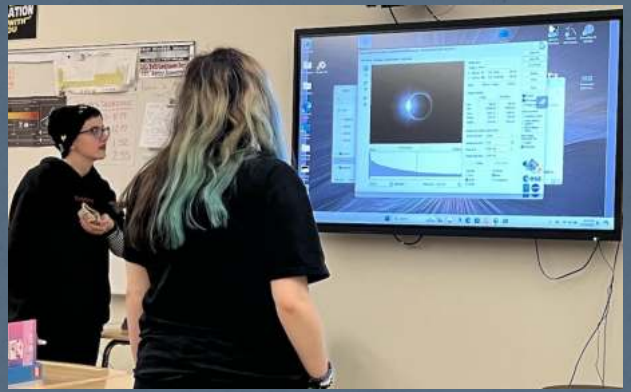


- FULL Weekend Schedule
- Weather- one amazing day in early April
- Venue - Watch Party with Family and Friends
- What Worked
  - Amazing Data
  - Students took Charge
- What Didn't
  - Some Students minimal involvement
  - Toddler and Telescope
  - Streaming Snafu



After the Eclipse

1. Data Party
2. Google Drive Folder
3. Student Interviews (Alison Allen)
4. Upcoming Opportunities



Overall

1. Challenges
   - Wrangling Students
   - Learning Curve with Discord
   - Female students shy to take charge of the telescope
2. Successes
   - All Students gained confidence with the telescope/tech
   - Phenomenal Amount of Work / Proportional to Reward

Hathaway Brown School

Janna Mino

Q & A

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