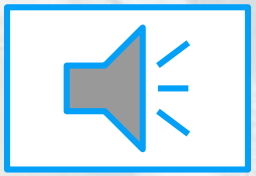
Girls STEAM Ahead with NASA

February 15, 2017

Hosts: Keliann LaConte and Anne Holland
Presenters: Kim Arcand and Bonnie Meinke



Audio problems? Click the “communicate” button at the top of your screen. Then click “test audio.”

Girls STEAM Ahead with NASA

UNIVERSE OF LEARNING

STAR_Net Webinar
February 15, 2017

NASA's Universe of Learning: Working to engage girls in STEM

Libraries are encouraged to partner with the NASA's Universe of Learning science education program throughout the spring to empower women's success in STEM starting from when they are young.

Events are open to all family members, regardless of gender, but focus on engaging girls in science using field-tested, hands-on activities.

The first events for *Girls STEAM Ahead with NASA* kick off during Women's History Month in March, and will continue through the spring/summer 2017.

Today's webinar features an activity librarians can use in their *Girls STEAM Ahead with NASA* event!

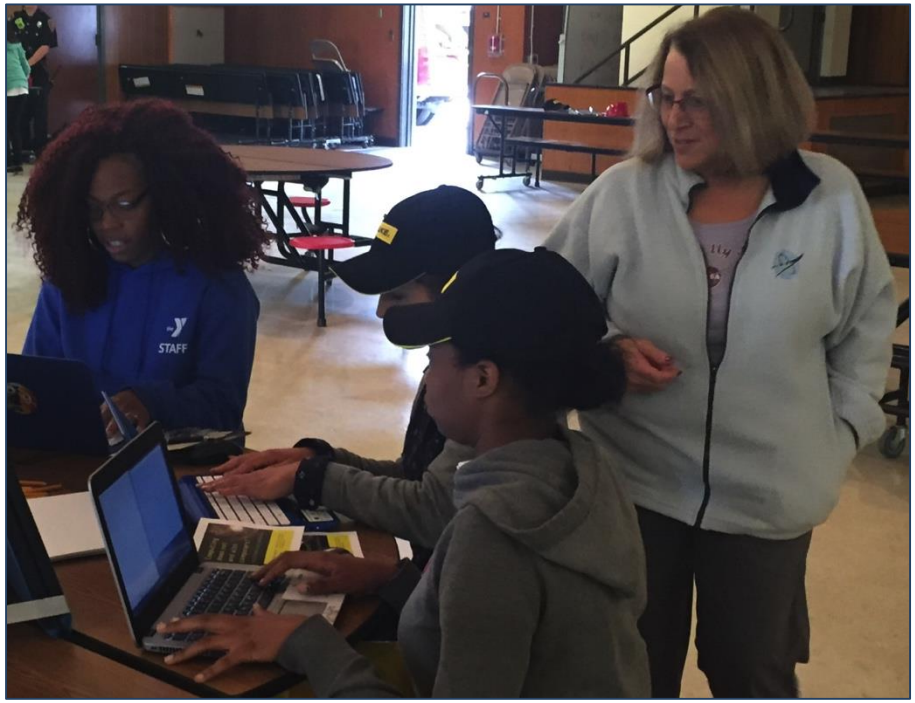
STAR net

UNIVERSE OF LEARNING

NASA's Universe of Learning Goal

Learners of all ages and <u>backgrounds</u> are engaged and immersed in exploring the universe for themselves.

Leveraging Pop culture and library networks to engage underrepresented girls

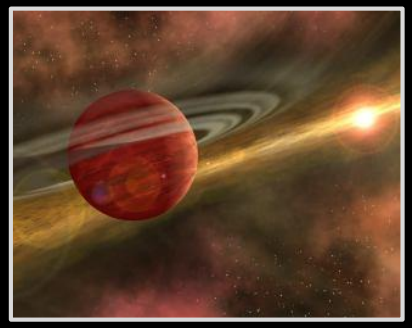


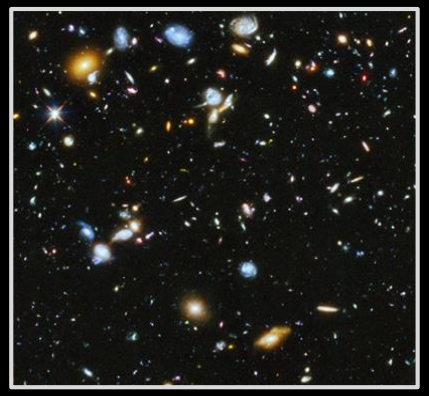
Celebrating Women's History Month with coding workshops, hands-on activities, and exhibits at libraries nationwide.

We have 53 libraries participating nationwide in 2017 – join us!

NASA@ My Library

Providing a Direct Connection to the Science

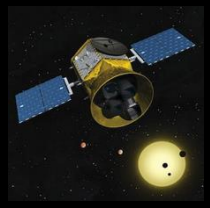


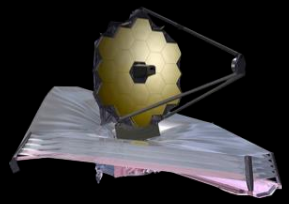


How does the universe work?

Are we alone?

How did we get here?





Why *Girls STEAM Ahead with NASA*?

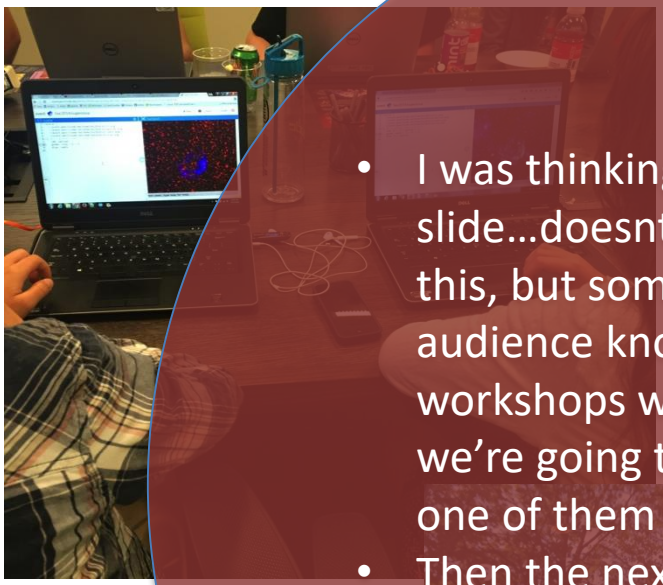
What the literature tells us: There is a need for:

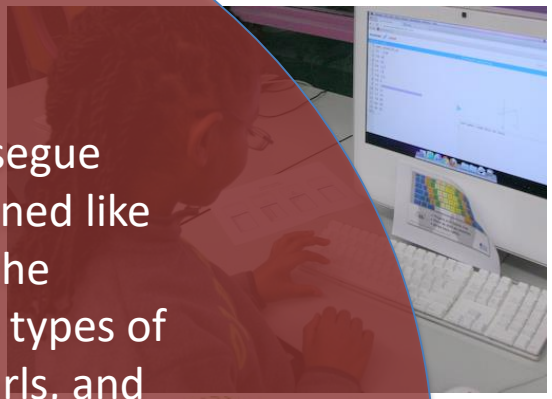
- Astronomical exhibits and interactives to enhance scientific literacy and support learning opportunities in informal venues. There is a need for community programs to reach, and engage, underrepresented audiences in STEM.

- Programs to engage and encourage girls in STEM and to build awareness of, and interest in, STEM careers.

We are providing accessible exhibits, community programs, and supporting educational content that feature NASA Astrophysics science and technology and ***interactions with Subject Matter Experts*** *in order to* ***increase awareness of how we know what we know about our universe and foster STEM identity.***

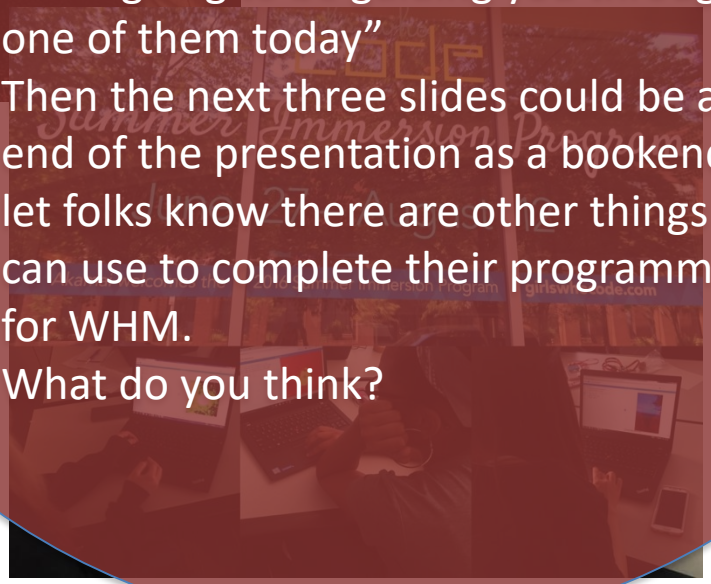
Example: Coloring/Coding the Universe Workshops





Kim -

- I was thinking this could be a segue slide…doesnt have to be designed like this, but something that let's the audience know "these are the types of workshops we do to engage girls, and we're going to be guiding you through one of them today"
- Then the next three slides could be at the end of the presentation as a bookend to let folks know there are other things they can use to complete their programming for WHM.
- What do you think?



PENCIL code

expanding your horizons
motivating young women in science + mathematics

Ten workshops to date, serving more than 250 girls.

Other Opportunities through Girls STEAM Ahead with NASA

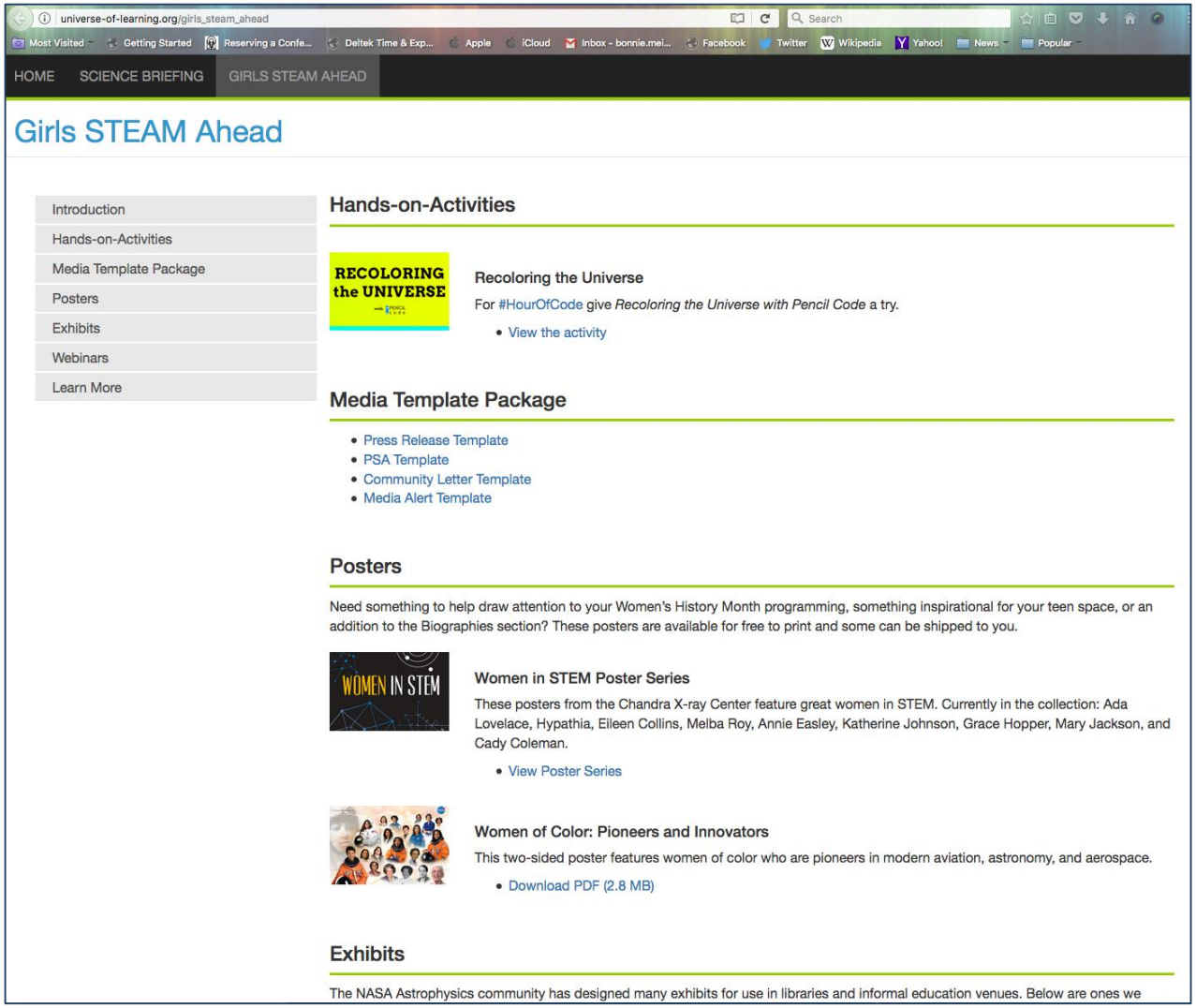
Exhibits:	*Here. There. Everywhere* *Light: Beyond the Bulb* *Visions of the Universe*

Other Opportunities through Girls STEAM Ahead with NASA

Discussion with Subject Matter Experts	*Virtual (Skype, Google Hangouts)* *In Person (select locations)*

Learn more about Girls STEAM Ahead with NASA

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



This product is based upon work supported by NASA
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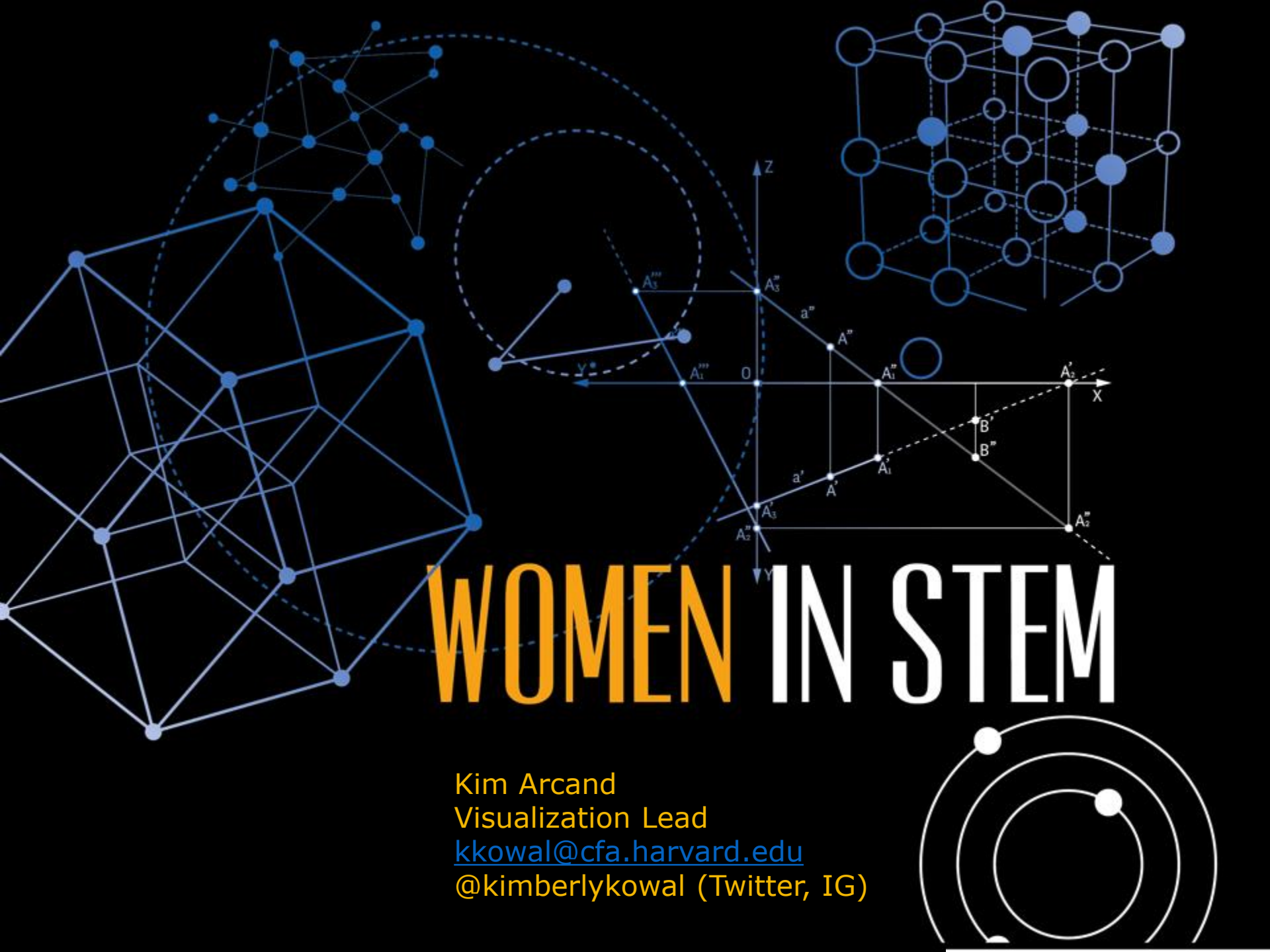
SONOMA STATE UNIVERSITY

STScI SPACE TELESCOPE SCIENCE INSTITUTE

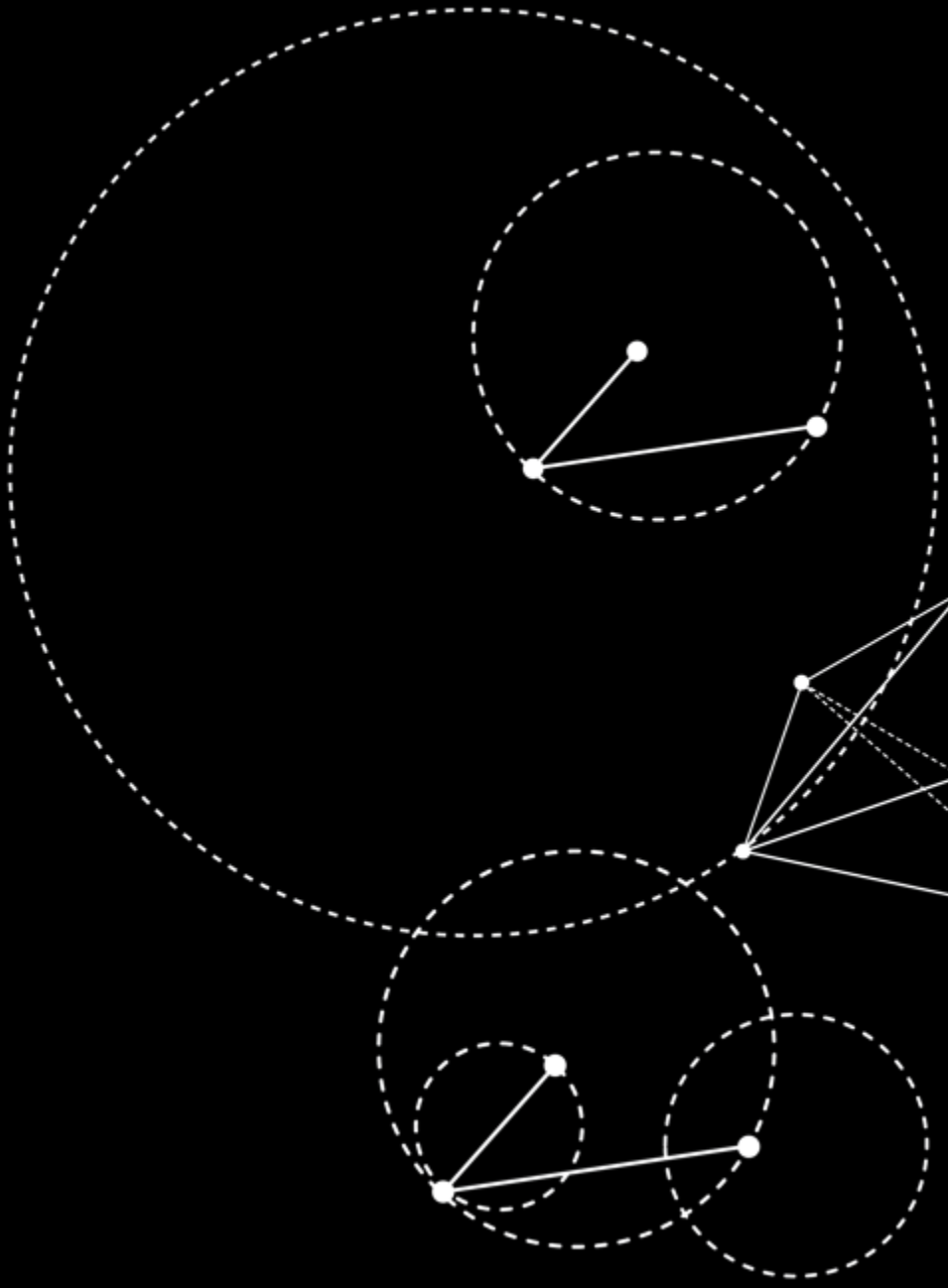
ipac

JPL
Jet Propulsion Laboratory
California Institute of Technology



WOMEN IN STEM

Kim Arcand
Visualization Lead
kkowal@cfa.harvard.edu
@kimberlykowal (Twitter, IG)



TODAY

IN COMPUTER SCIENCE

As of 2011, women made up only about

26%

of U.S. STEM workers

Computer science is the only field in science, engineering and mathematics in which the number of **women receiving bachelors degrees has decreased** since 2002—even after it showed a modest increase in recent years.

(Larson, 2014)

According to studies, contributing factors include:

- a culture that encourages young women to play with dolls rather than robots and pursue traditionally female careers
- a self-perpetuating stereotype that a programmer is a white male.

(Larson, 2014)

Why should we care?

By 2020, it is estimated that there will be 1.4 million computer-science related jobs available, in the U.S. but:

Only 400,000 CS graduates to fill them.

Why should we care?

Better job security and pay but also, more and varied viewpoints.

For example:

Medication
Women can experience more and varied side effects from many medications than men do because such medicines can be biased towards male subjects
(Beerya & Zucker)

Engineering
Automobile air bags have been more dangerous for women of smaller stature because engineers originally designed and tested them around the male body.

Why should we care?

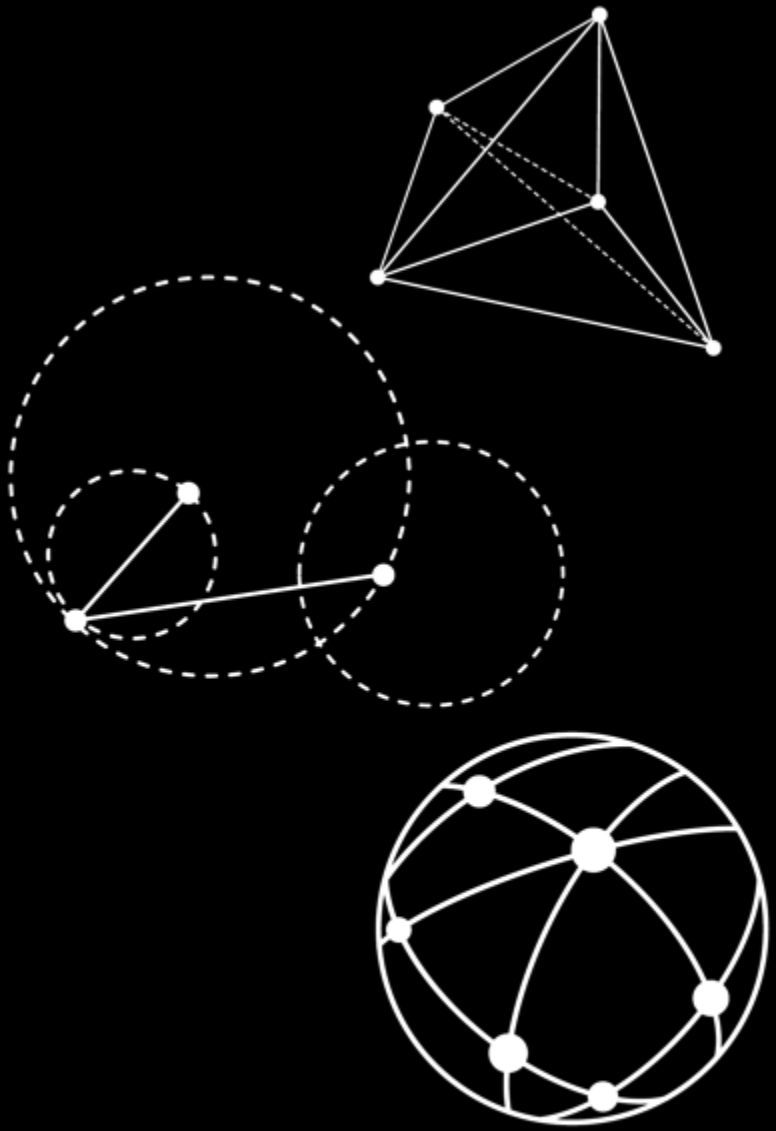
Beyond representation issues, and beyond STEM jobs and outputs, lie more subtle reasons for improving girls' interest in and potential prospects in STEM fields:

- Improving critical thinking skills (Duran & Sendag, 2012)
- Making up well-informed citizenry (Marincola, 2006). STEM issues affect people in the voting booth, in government, in finance, in the world as a whole.
- What problems need solving, for whom they're solved, and how they're solved, with and in STEM fields, is an issue in which all people should participate.

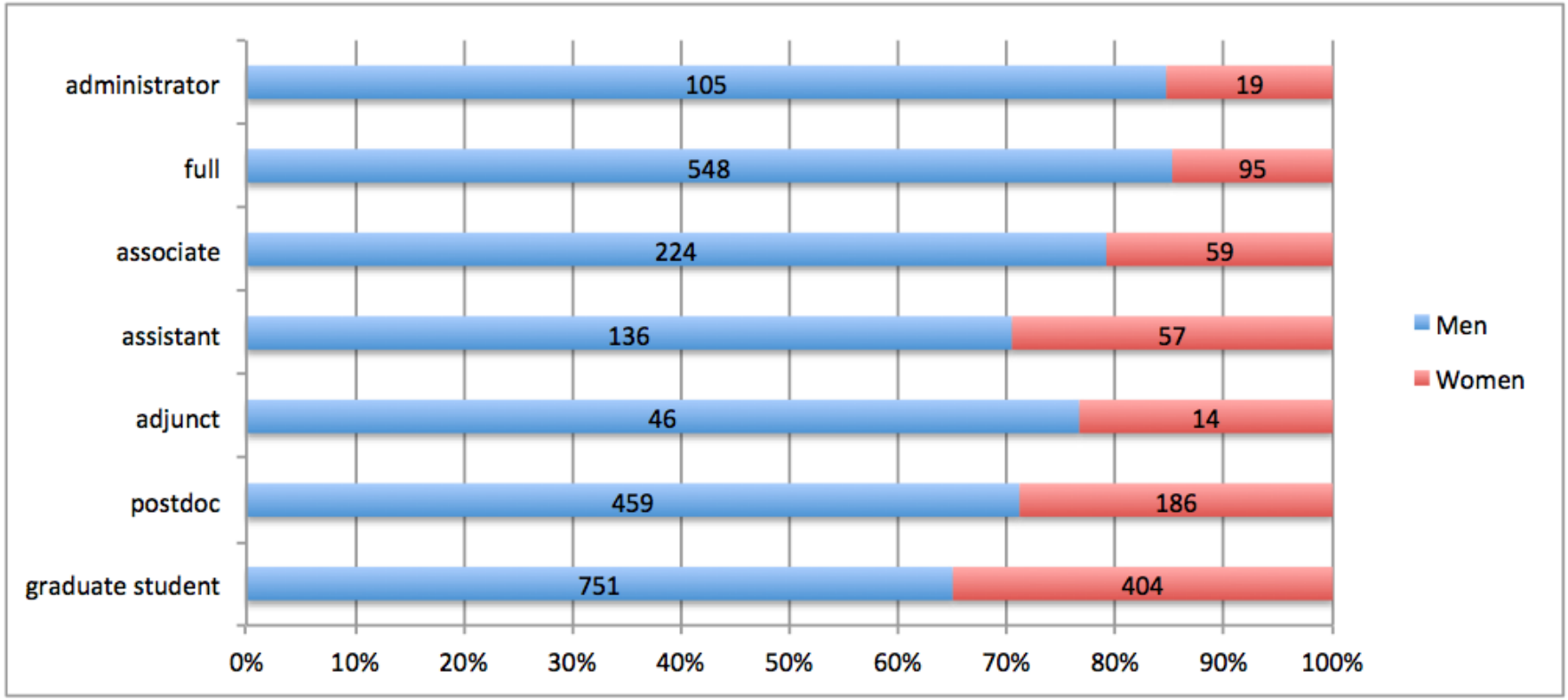
Upward trends?

- In June, Carnegie Mellon University announced that for the first time ever, **40% of incoming computer-science majors are female.** The university attributes the achievement to increasing female-focused networking events, mentoring opportunities, and on-campus community building.

- At the University of California at Berkeley, women outnumbered men this year for the first time in the university's introductory computer-science course.



TODAY IN ASTRONOMY



Snapshot of gender demographics of astronomers as of January 1, 2013. This shows all levels, including administrators and adjuncts). The fraction of women decreases monotonically with seniority in the field. Ref: AAS Committee on the Status of Women in Astronomy (CSWA) *January 2014 Status: A Report on Women in Astronomy*

As of 2013, there were

95 female full professors in astronomy in the U.S.

(Vs. 543 male professors of astronomy)

As of 2015, there were

78 black American women with PhDs in physics.

TODAY

Of **1,000** new hires per year

37%

are women

"I was in college when Sally flew and frankly I don't think I really paid attention to the space shuttle program until STS-7, [Ride's first flight]," said NASA Deputy Administrator Lori Garver said. "She had a great influence on me. She shaped my life in this program."

"Role models do, in fact, matter," Garver added. "We've all in a way been touched by Sally."

More than

560

People have been trained as astronauts worldwide

75

astronauts have been female

Valentina Tereshkova
Svetlana Savitskaya
Sally Ride
Judith Resnik
Kathryn D. Sullivan
Anna Lee Fisher
Margaret Rhea Seddon
Shannon Lucid
Bonnie J. Dunbar
Mary L. Cleave
Ellen S. Baker
Kathryn C. Thornton
Marsha Ivins
Linda M. Godwin
Helen Sharman
Tamara E. Jernigan
Millie Hughes-Fulford
Roberta Bondar
Jan Davis
Mae Jemison
Susan J. Helms
Ellen Ochoa
Janice E. Voss
Nancy J. Currie
Chiaki Mukai
Yelena V. Kondakova

Eileen Collins
Wendy B. Lawrence
Mary E. Weber
Catherine Coleman
Claudie Haigneré
Susan Still Kilrain
Kathryn P. Hire
Janet L. Kavandi
Julie Payette
Peggy Whitson
Sandra Magnus
Laurel B. Clark
Stephanie Wilson
Lisa Nowak
Heidemarie M. Stefanyshyn-Piper
Anousheh Ansari
Sunita Williams
Joan Higginbotham
Tracy Caldwell Dyson
Barbara Morgan
Kalpana Chawla
Yi So-yeon
Karen L. Nyberg
K. Megan McArthur
Nicole P. Stott

Dorothy Metcalf-Lindenburger
Naoko Yamazaki
Shannon Walker
Liu Yang
Wang Yaping
Yelena Serova
Samantha Cristoforetti
Kathleen Rubins
Anne McClain
Christina M. Hammock
Jessica U. Meir 3
Nicole Aunapu Mann
Serena M. Aunon
Jeanette J. Epps
Patricia Robertson
Nadezhda Kuzhelnaya
Marianne Merchez
Yvonne Cagle
Christa McAuliffe
Tatyana Kuznetsova
Zhanna Yorkina
Irina Solovyova
Valentina Ponomaryova

My role in SCIENCE

Not an astronaut.

(though I did want to be an astronaut when I was very young).

My Story.

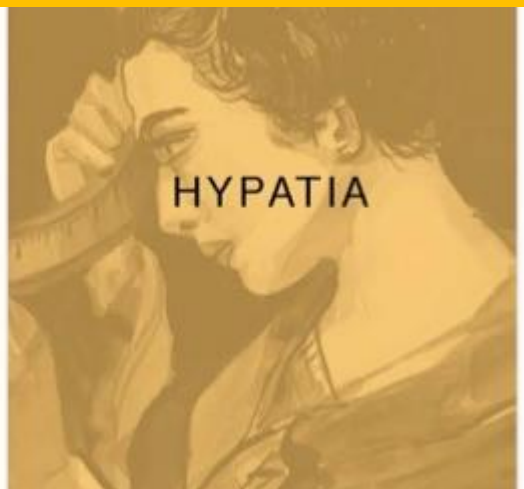
Molecular biology →
Computer science →
NASA →
Data Visualization →
Aesthetics Research →
Science comm.

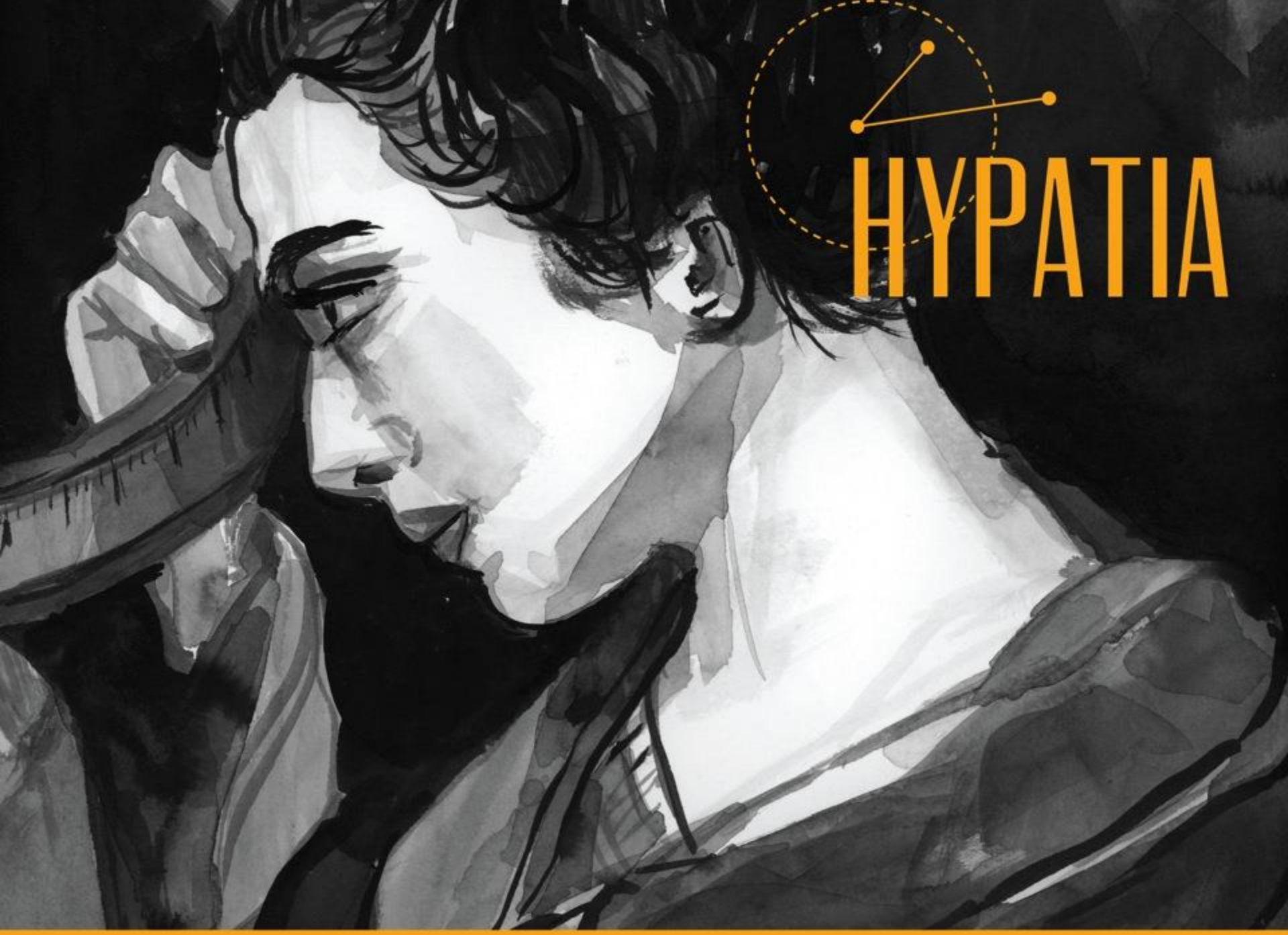
WOMEN IN SCIENCE

We celebrate women in STEM, (Science, Technology, Engineering and Math) both acknowledged and unknown, for their role in the exploration of the world and Universe around us.

The history of women's contributions to the fields of science, technology, engineering, and math (STEM) is long and varied. But it has also often been overlooked or underrepresented. This series highlights only a very few of the women who have made important discoveries and have had a crucial impact on STEM fields. This, however, is not just a look into the past. Today, women are in every STEM discipline, in every type of job, and represent the widest range of background and experiences.

http://chandra.si.edu/women




HYPATIA


ADA
LOVELACE


KATHERINE
JOHNSON


GRACE HOPPER

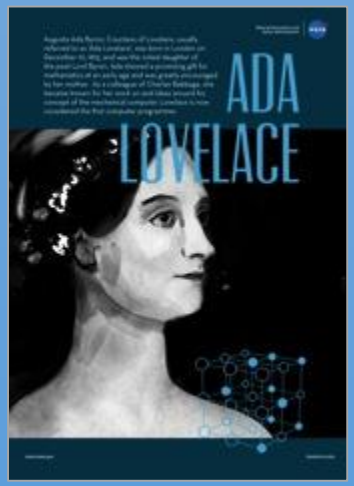
MELBA ROY


MARY JACKSON

ANNIE EASLEY


CADY COLEMAN

EILEEN COLLINS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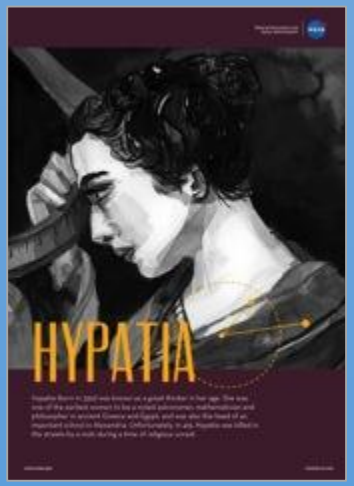
HYPATIA


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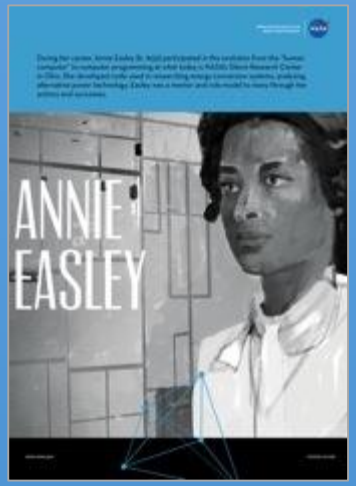
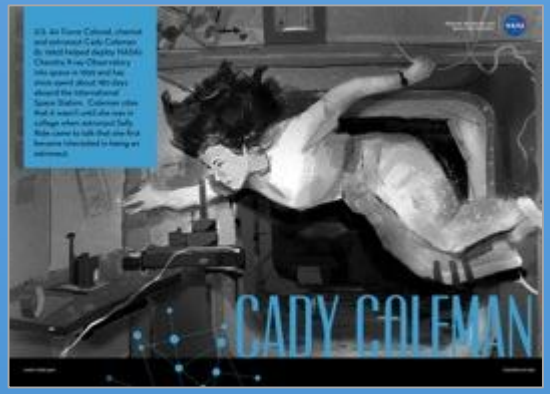
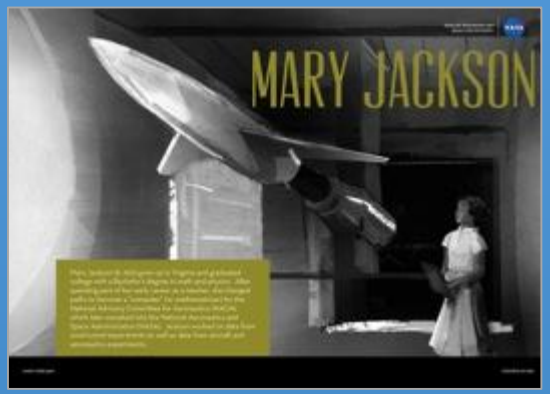
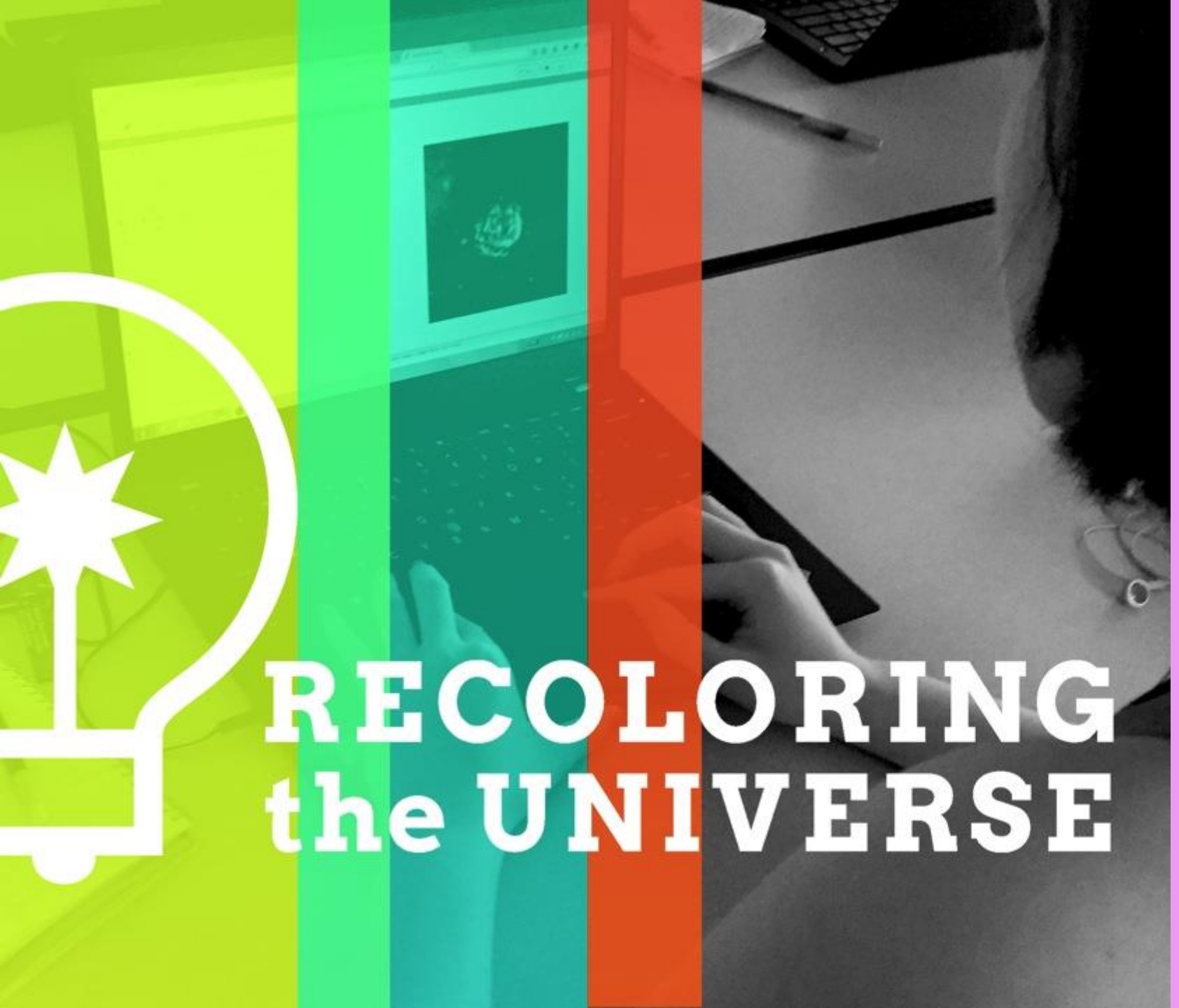

ANNIE
EASLEY


GRACE HOPPER


CADY COLEMAN

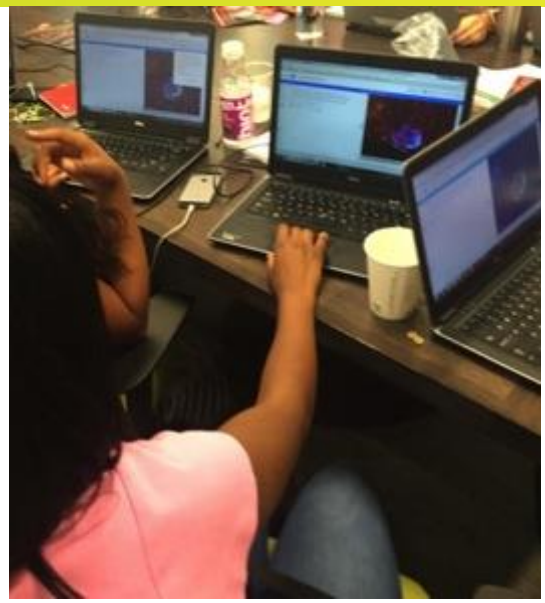

MARY JACKSON

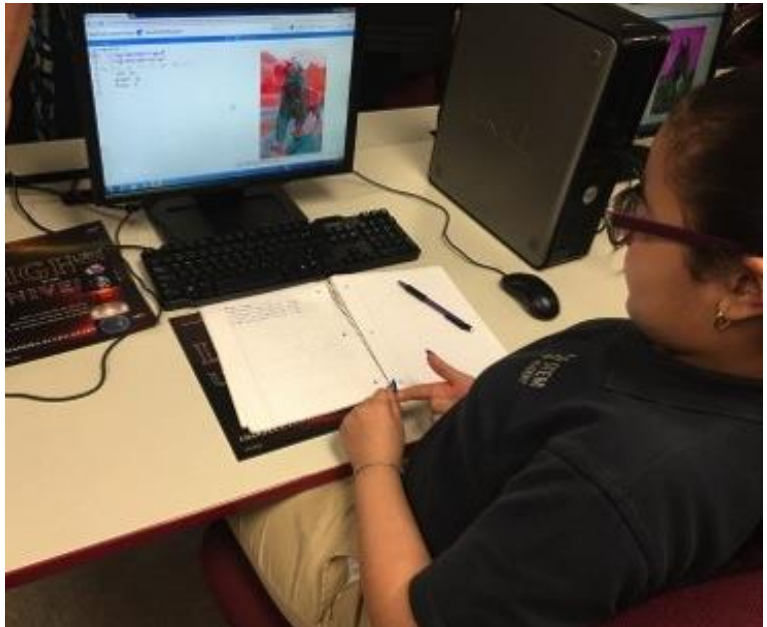

KATHERINE
JOHNSON


RECOLORING
the UNIVERSE

Working with data from NASA’s Chandra X-ray Observatory and other telescopes on topics from exploded stars, to star-forming regions, to the area around black holes, students learn basic coding (for beginners, no experience required) and follow a video tutorial to create a real world application of science, technology and even art. By enabling students to use real data from NASA’s Chandra X-ray Observatory, along with other astronomical data, this project helps show just how integral coding is in the pursuit of learning about our Universe.

Chandra.si.edu/code





"Not only is working at NASA my dream job, but I also enjoyed the coding and coloring exercises we completed. It was so cool that we had enough coding experience to understand how to color and mash up images. It was so fun!!!!"

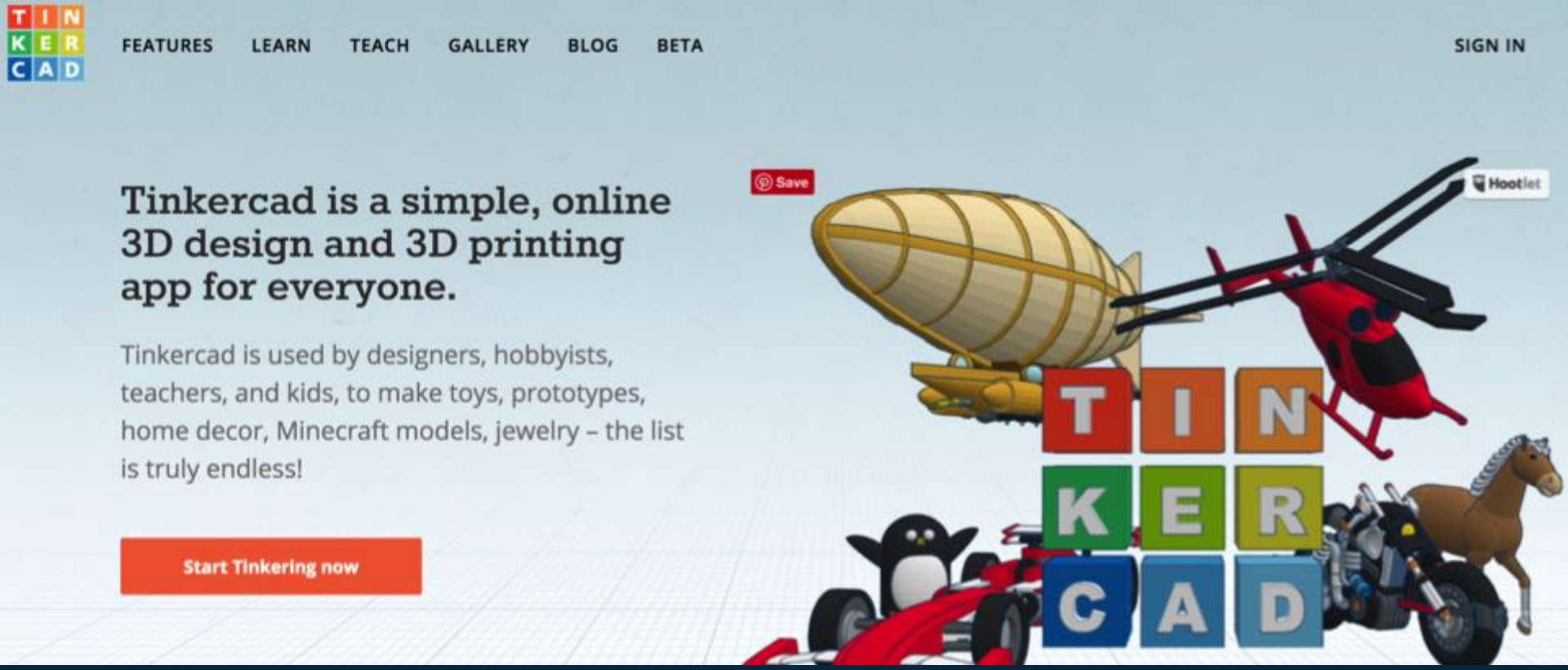
"It made me have a whole new outlook on ways coding can be used."

Response

- Favorably reviewed by participants
- Highly rated by code.org educators
- Featured on code.org as way to connect science and computer science
- Highlighted in the CSTA (computer science teachers association) newsletter


how to
BUILD a
GALAXY

How can 3D modeling help experts and non-experts approach the different kinds of objects in space? Learn how 3D models are created with data from NASA's Chandra X-ray Observatory/Smithsonian Astrophysical Observatory and other observatories. Use free CAD software to explore 3D modeling, and receive a 3D printed object after the workshop. The goal is to help learners understand the life cycles of stars and galaxies, while also experimenting with cutting-edge technology through both hardware and software.



3d printing with **Tinker CAD**

Chandra.si.edu/build

Illustrations: Kristin DiVona