Lesson: Who Works with Rubin?

Description:

This is a fun activity suitable for a wide range of students from High School to College. While there are no pre-requisite skills required, the activity works even better mid-way through a unit or course in astronomy, so that students have already encountered something about gathering astronomical images and/or telescopes. It has been designed and tested with small groups working in both a standard lab setting as well as in an online class with breakout rooms, but it can easily be adapted for individual homework assignments or as a research paper assignment.

Time Required:

20 - 60 minutes, depending upon how it is deployed, and the depth that is asked in the research done, and the discussion that follows.

Objectives:

- Provide students with a sense of possibility, and help them see that literally anyone can be an astronomer, or someone who works with astronomers to help us learn about the universe.
- Help students see that astronomy and science today are international in scope, full of opportunities across a huge range of disciplines including almost every type of engineering, as well as data communications, data processing, manufacturing, construction, management, and education.

Introduction

Vera Rubin was a noted American astronomer. She is credited with recognizing that galaxies were held together by “dark matter”, through her observations of rotation curves of stars within a galaxy. She passed away in 2016, but you can read more about her, and her contributions to Astronomy at Wikipedia’s site https://en.wikipedia.org/wiki/Vera_Rubin, and see a video clip from a TV Series written by Don Goldsmith called, “The Astronomers”, at https://www.youtube.com/watch?v=XccDZ4WAb-M.

In her honor, the National Science Foundation Large Synoptic Survey Telescope (LSST) being constructed was renamed the Vera C. Rubin Telescope, and it will start to collect its first images this year. You can read about the facility by visiting https://www.lsst.org/ and visit https://rubinobservatory.org/about/vera-rubin to learn about Vera Rubin, as well as watch a short video.

Who Works with Rubin?

Activity Steps (adjust as necessary for the target audience, and whether this is an in-person activity, a small-group activity in class, or a homework assignment)

Step 1: Try to **"Picture an Astronomer"!**

a. Ask participants to close their eyes, and "picture" an astronomer working at the Observatory or with the astronomical data it captures. Who do they picture? What characteristics do they have? How do they dress? Can they share a person from history or our current world that comes to mind? Perhaps characters from movies, TV, or books? Encourage students to be creative here!

b. Now ask participants to turn to a neighbor, or share in a small group, or share in a discussion post, who they pictured? Was it a man? Were they old? Was it someone who looked like Galileo or Einstein or "Doc Brown" from the Back to the Future movies (expertly captured by actor Christopher Lloyd)? Did many students picture similar people from history or today? Were there any stereotypes they noticed of astronomers and people working at an observatory?

Step 2: **Investigate who DOES work at the Vera Rubin Observatory**

a. Ask students to research one or more of the people working at the observatory, drawing from any of the resources on the following pages.

b. Goals for the research could include capturing (depending upon student level):

   i. **Basic Identification:** Name, Job Title, Where they are from
   ii. **Background**: Where they went to school, their major
   iii. Why did they want to work on the project?
   iv. **Something interesting** about the person they research that was shared in the profile. What surprised them, or was encouraging to hear/read?

c. Strategies for conducting the research could include asking students to find a specific number of people (2 - 5 or more) representing: engineers, women, people in data processing, construction workers, managers, scientists, people from a specific country, people who share particular interests.

d. Ask students to document their research in some way, perhaps by creating small posters, making a drawing of the people they investigated, making a webpage, making "trading cards" (examples are already available at the "Rubin Voices" site linked above, and instructions and templates are available at https://rubinobservatory.org/education/educators/make-your-trading-card.)

Resources for Who Works with Rubin

- "All Rubin Voices" - a collection of interviews from some of the staff, scientists, and educators who are part of the observatory or use its data—and listen to what they sound like too! https://rubinobservatory.org/explore/voices/all-voices

- Vera C. Rubin Observatory "Past Staff Highlights" https://www.lsst.org/past-staff-highlights

- "LSST is Awesome!" video https://www.youtube.com/watch?v=8gOElWQFZsY&list=PLPINAcUH0dXYCsFMTvaFAoqSufWWAQ5RF

- Rubin Observatory Videos for the General Public https://www.youtube.com/playlist?list=PLPINAcUH0dXYCsFMTvaFAoqSufWWAQ5RF

- Lightning Stories - a series of short videos introducing Rubin Observatory staff and contributors. Each profile is 4-5 minutes in length. Start times on the videos for each person may be found in the chart below.

Name	Job	Starts at
Giovanni Corvetto	Safety, Health & Environment Manager	1:08:25
Yusra AlSayyad	Science Pipeline Engineer/ Time Domain Scientist	1:14
Lauren Corlies	EPO Data Scientist, Galaxy Evolution & Simulations	1:19:20
Ranpal Gill	Communications Manager	1:24:35
Bastien Gounon	Data & Software Engineer, IN2P3 France	3:20
Regina Matter	SLAC Camera Team Support	8:00
Emily Acosta	Senior Graphics & Web Developer	12:55
Juan Fabrega Cortes (talk in Spanish)	Summit Electrical Engineer	16:40
Blake Mason	EPO Technical Lead	0:05
Te-Wei Tsai	Senior Software Engineer	5:20
Carola Gonzalez	Financial Technician	9:55
Jeff Tice	SLAC Camera Clean Room Manager	17:20
Angelo Fausti	Software Engineer	0:05
Sandra Romero (talk in Spanish)	Security Coordinator	4:15

Richard Dubois	SLAC Senior Staff Scientist, LSST Camera	8:00
Margaux Lopez	Commissioning (Mechanical) Engineer	17:20
Jose Pinto	Website Designer	0:05
Nicole Auza	Administrative Assistant, English- Spanish Translator	3:25
Glenaver Charles-Emerson	Administrative Assistant	8:10
Kevin Siruno	Systems Verification Engineer	12:25
Claudia Araya	EPO team, Chile	55:30
Sebastian Bonyard	Cosmologist, Supernova Scientist	50:30
Michelle Butler	Data Facility Project Manager	1:00:15
Meredith Rawls	Data Management	37:00
Diane Hascal	Mechanical Engineer	46:20
Brian Stalder	Commissioning Scientist	41:30
Bill Schoening	LSST Designer, 50+ year career	65:15
Azalee Bostroem	Supernova Scientist	19:20
Orion Eiger	Software Developer	40:00
Mark Pitts	Physics professor	24:09
Fernanda Urrutia	EPO Chile Coordinator	29:50
Suzanne Jacoby	Communications Team	5:05
Chris Mendez	LSST Camera Systems Engineer	11:05
Adam Thornton	Jupyterlab Rubin Science Platform	0:10
Tiago Ribeiro	Software Architect	14:50
Julio Constanzo	IT Network Engineer	1:07:50
Agnes Ferte	Rubin Operation Scientist, Cosmology	1:11:25
Clare Higgs	EPO Data Scientist	1:15:45
Ryan Lau	Community Scientist	1:20:15

Be sure to ask students to cite their sources appropriately using whatever standard citation style you want them to learn. If they use Wikipedia, show them how to find "Cite this page" from the TOOLS link at the top of the page.

Step 3: **Share the results!**

a. In person, have students share aloud a synopsis of the people they researched, and something that interested them or surprised them. For an online class, or for those with access to an online course management system, have students post their research for everyone to see, and possibly ask them to read and respond to the posts of classmates.

b. Be sure to ask students to include why they chose the people they selected to profile, and how after doing the research, they might change their answer to the first part of the activity, ***Picture An Astronomer***.

c. Ask students if they would like to work with the Rubin Observatory one day, too? Do they think they could be an astronomer, engineer, technician, telescope operator, data processing professional, or another job they saw at Rubin?

Discussion Questions and Going Further ideas (also adjust as necessary for the target audience, and whether this is an in-person activity, a small-group activity in class, or a homework assignment. Some of these questions have worked very well in a college lecture course. If you have other questions that worked well, please share them with the team.)

➢ Here is a link to some Google slides that may be used to do an alternate version of the above activity.

➢ The "Picture an Astronomer" activity can sometimes help us to see unstated biases, created because of the portrayals of astronomers presented in TV and films. Often students will picture someone like Galileo, a Caucasian male in a long robe, peering through a telescope at the stars. Or perhaps they will recognize someone like Neil deGrasse Tyson as an astronomer, but not know of women who have made contributions to the field. Quite possibly students might not be able to name any astronomers from South America or from countries outside of Europe and North America. After doing the research, have students discuss where - and why - these stereotypes might have originated.

➢ For extra credit, or a longer-term project, have students reach out by email to one or more of the people they researched and seek out additional details about the journeys those people traveled to be at the Rubin Observatory today. Ask them to develop a set of questions, create an appropriate request for assistance, arrange for an online session if appropriate, and follow-up with a "thank you" note of some kind.

➢ Considering how AI systems like ChatGPT can now provide immediate responses to questions like "Research and Write a short profile about XXX", encourage students to use that system as well as do their own research, and identify what the AI response provides as well as what it missed.

Acknowledgements

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Comments and ideas are welcome! Please reach out to us:

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