



Building Inclusive Futures for BIPOC and LGBTQIA Learners in STEM Education with Amateur Radio

8 May 2025



National Radio
Astronomy
Observatory

Take a moment



Breathe: Moment of Silence for those in harm's way

Agenda

- Ham (STEM) identity
- Barriers to STEM identity
- Ham Radio Cross-generational co-learning opportunity
- My secret plan for world domination
- What questions do you have?
- 73s & TNX

Long term objective is to help learners develop STEM (ham radio) identity

Ubuntu



I am because we are.

Created by Gan Khoo Lay
from Noun Project

Who I am?

Who claims me?

Whom do I claim?

Competence:
one's
knowledge and
understanding
of STEM

What does a _____ look
like? Do I look like that?

How do other people see me?

Recognition:
being seen by
others and
seeing oneself
as a STEM
person

Performance:
one's ability to
engage in
various STEM
practices

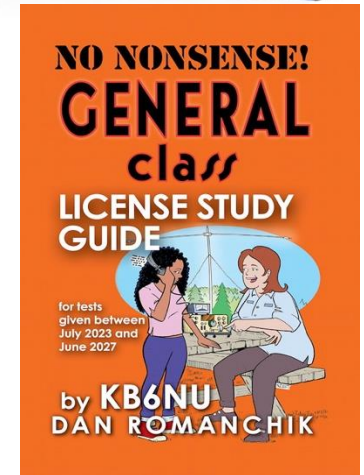
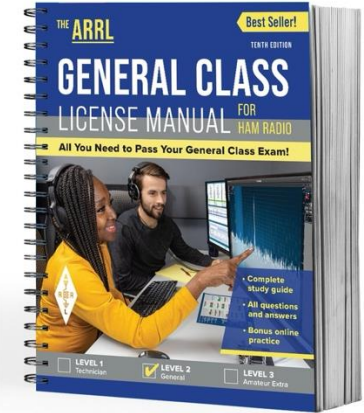
Where do I belong?

What is STEM Identity?

"In everyday language, one might define "identity" as the way that people answer questions such as: "Who do I think I am, or who can I be, where do I belong, and how do I think other people see me?" from <https://www.informalscience.org/identity>

STEM identity: Help! Need a photo of a Black women ham radio operator!

Ham Radio and Gender Politics by Matthew Wills, <https://daily.jstor.org/ham-radio-and-gender-politics/>

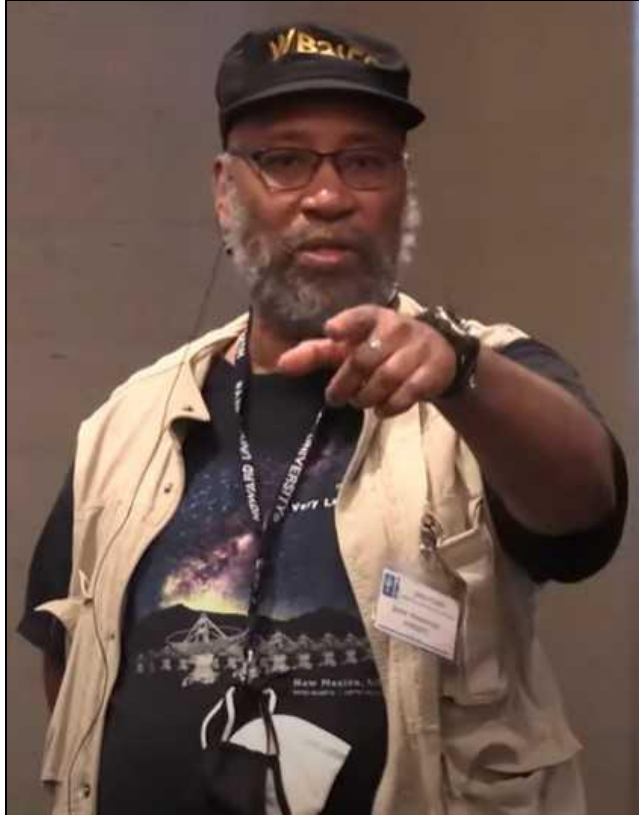


What does a ham radio operator look like?

Why could I find no pictures of a Black or Latine woman holding a microphone?

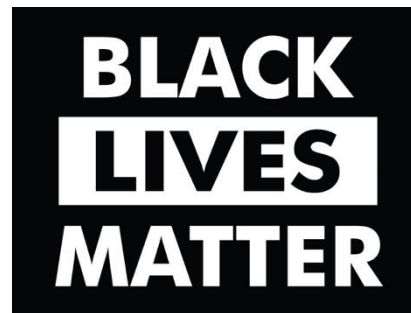
... looks like Rhonda Leonard, KC1KYN (a real Ham) on the cover of the ARRL License manual

A STEM identity teachable moment from my own life.



Are you sure you're in the right place?

What does a REAL ham radio operator look like?

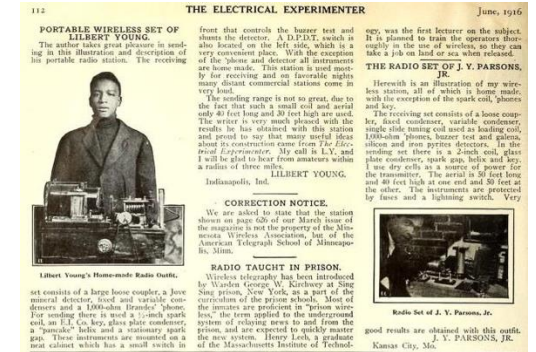
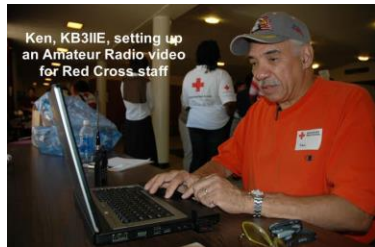


STEM is a BIPOC Place



Sam from earth, calling space station

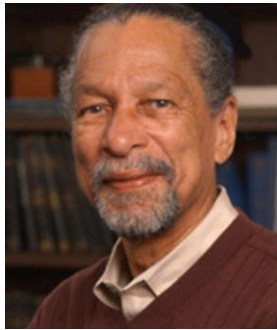
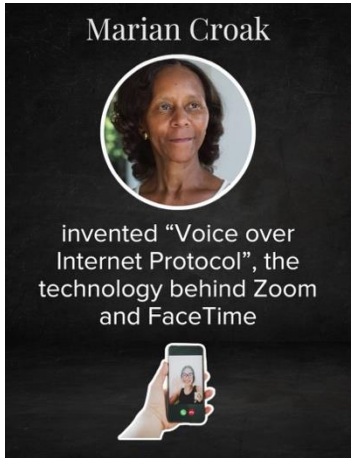
BIPOC folk were/are integral to wireless communication.



Competence:
one's knowledge and understanding of STEM

Performance:
one's ability to engage in various STEM practices

Recognition:
being seen by others and seeing oneself as a STEM person



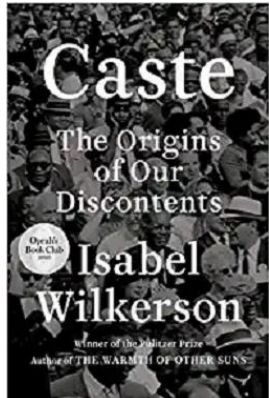
W3LF - First Black Radio Station Operator, 1926



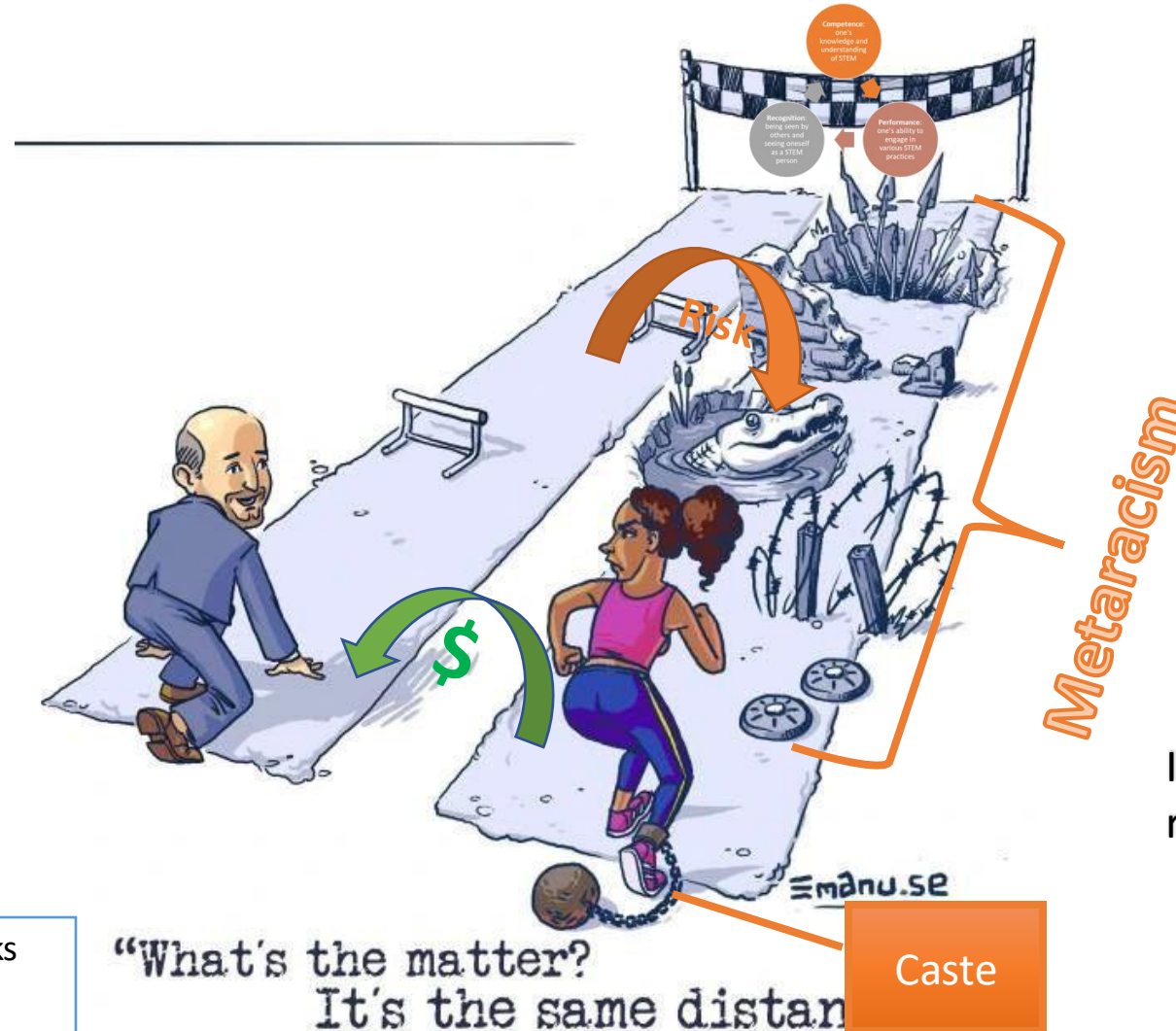
"The Black Scientific Renaissance of the 1970s-90s:" African American Scientists at Bell Laboratories <https://www.aip.org/history-programs/physics-history/teaching-guides/black-scientific-renaissance-1970s-90s-african>

Barriers to STEM identity are real and prompt tough, grown-up questions

STEM Is Failing People of Color. What Educators Can Do by Ebony O. McGee —
<https://www.edweek.org/teaching-learning/opinion-stem-is-failing-people-of-color-what-educators-can-do/2024/01> Ed Week
January 25, 2024



Random House Trade Paperbacks
(February 14, 2023), ISBN-13 :
978-0593230275



Jobs vs. (environmental) Justice?

How do I support
the caste system?

Short-term vs. long-term?

How do I benefit
from caste?

How does my
Privilege manifest?

Individual success
vs. collective
survival?

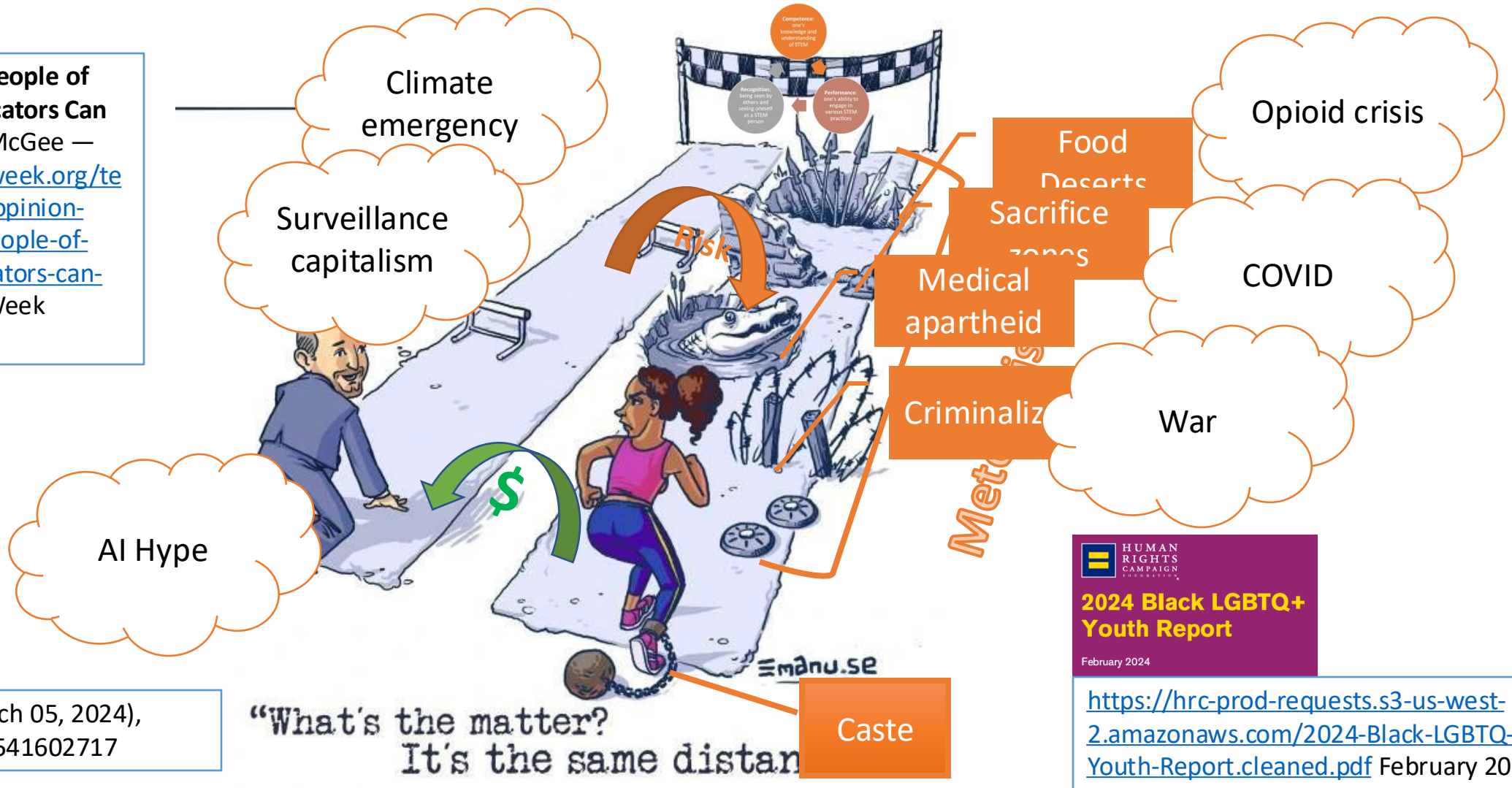
Is it me or is it
racism?

Barriers to STEM identity are real and impede achievement

STEM Is Failing People of Color. What Educators Can Do by Ebony O. McGee —
<https://www.edweek.org/teaching-learning/opinion-stem-is-failing-people-of-color-what-educators-can-do/2024/01> Ed Week
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METARACISM
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METARACISM
HOW SYSTEMIC RACISM
DEVASTATES BLACK LIVES—
AND HOW WE BREAK FREE
TRICIA ROSE

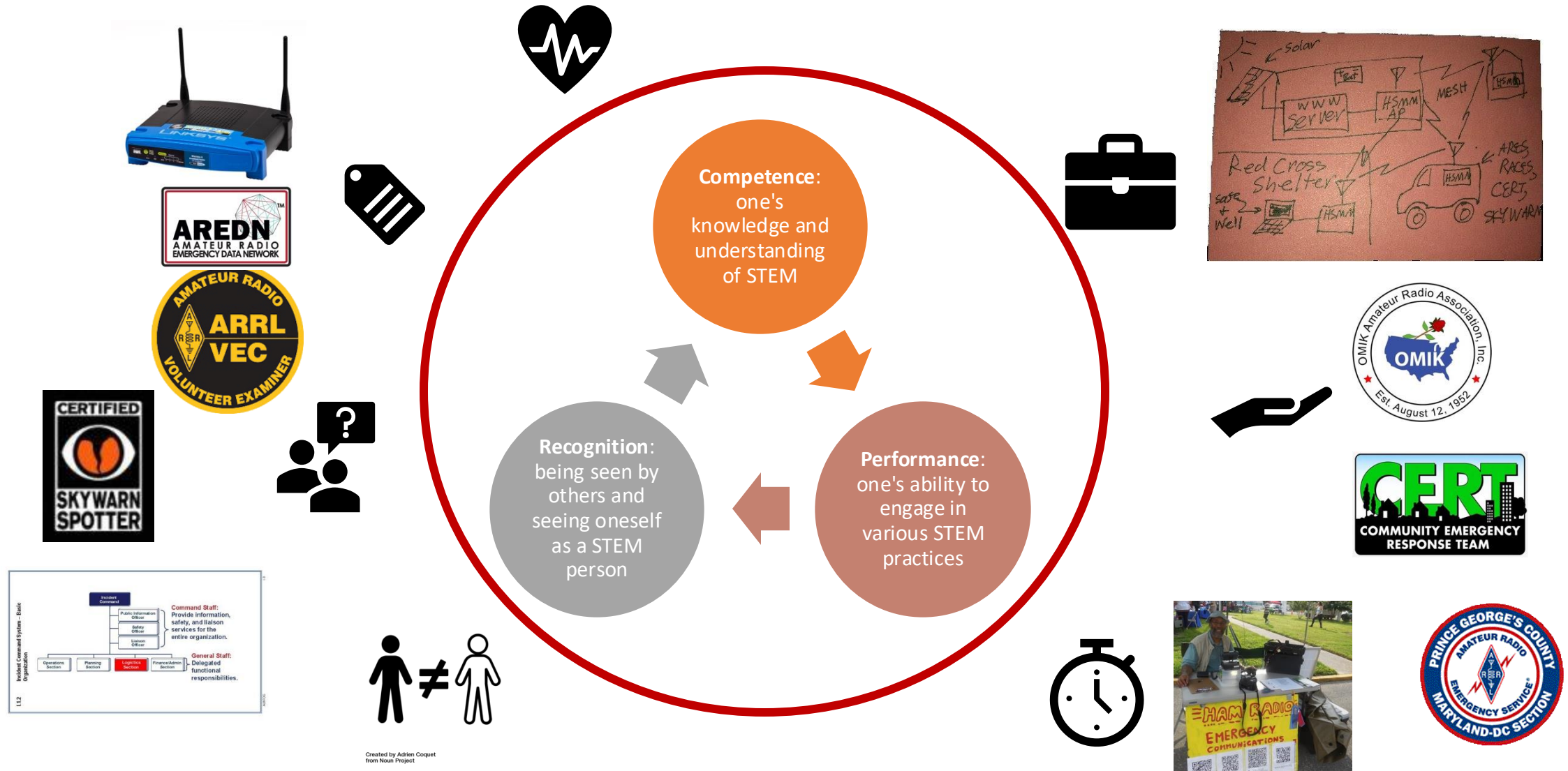
Basic Books (March 05, 2024),
ISBN-13 : 978-1541602717



 HUMAN RIGHTS CAMPAIGN FOUNDATION
2024 Black LGBTQ+ Youth Report
February 2024

<https://hrc-prod-requests.s3-us-west-2.amazonaws.com/2024-Black-LGBTQ-Youth-Report.cleaned.pdf> February 2024

How I developed an alternative STEM identity with Ham Radio.



Audible Citizenship and Audiomobility: Race, Technology, and CB Radio by Art M. Blake https://www.jstor.org/stable/41237565?seq=1&cid=pdf-reference#references_tab_contents

How do learners address barriers to their Ham Radio (STEM) identity.

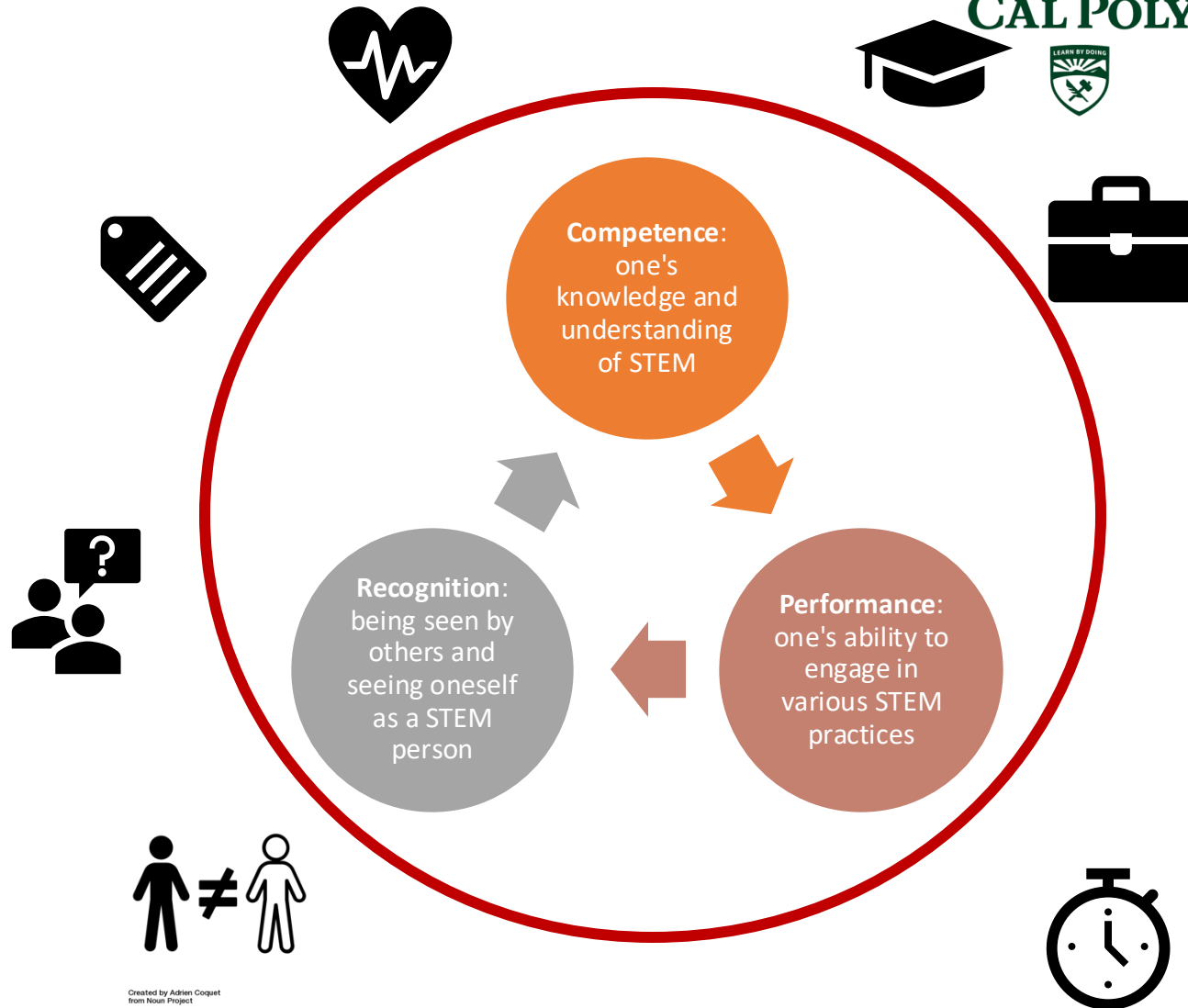


PHYS 501 : Physics of Ham Radio

<https://mst.rice.edu/PHYS501/>



<https://righttobe.org>



Created by Adrien Coquet from Noun Project

Amateur Radio in STEM Education

https://www.researchgate.net/publication/296684300_Amateur_Radio_in_STEM_Education

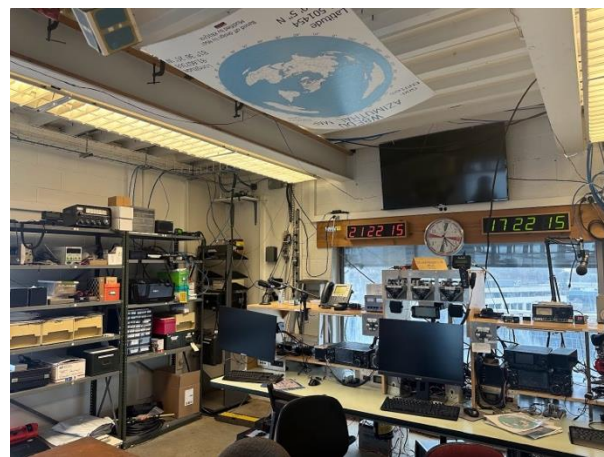
GREAT IMPEDANCE MATCH FOR KNOWLEDGE TRANSFER: Amateur Radio as Part of Electrical and Computer Engineering Education <https://content-calpoly-edu.s3.amazonaws.com/e/1/documents/Eta%20Kappa%20Nu%20the%20Bridge%20May%202019%20publication.pdf>

Radio Sloyd: An Amateur Radio Approach to a University-Level Critical Thinking and Writing Class

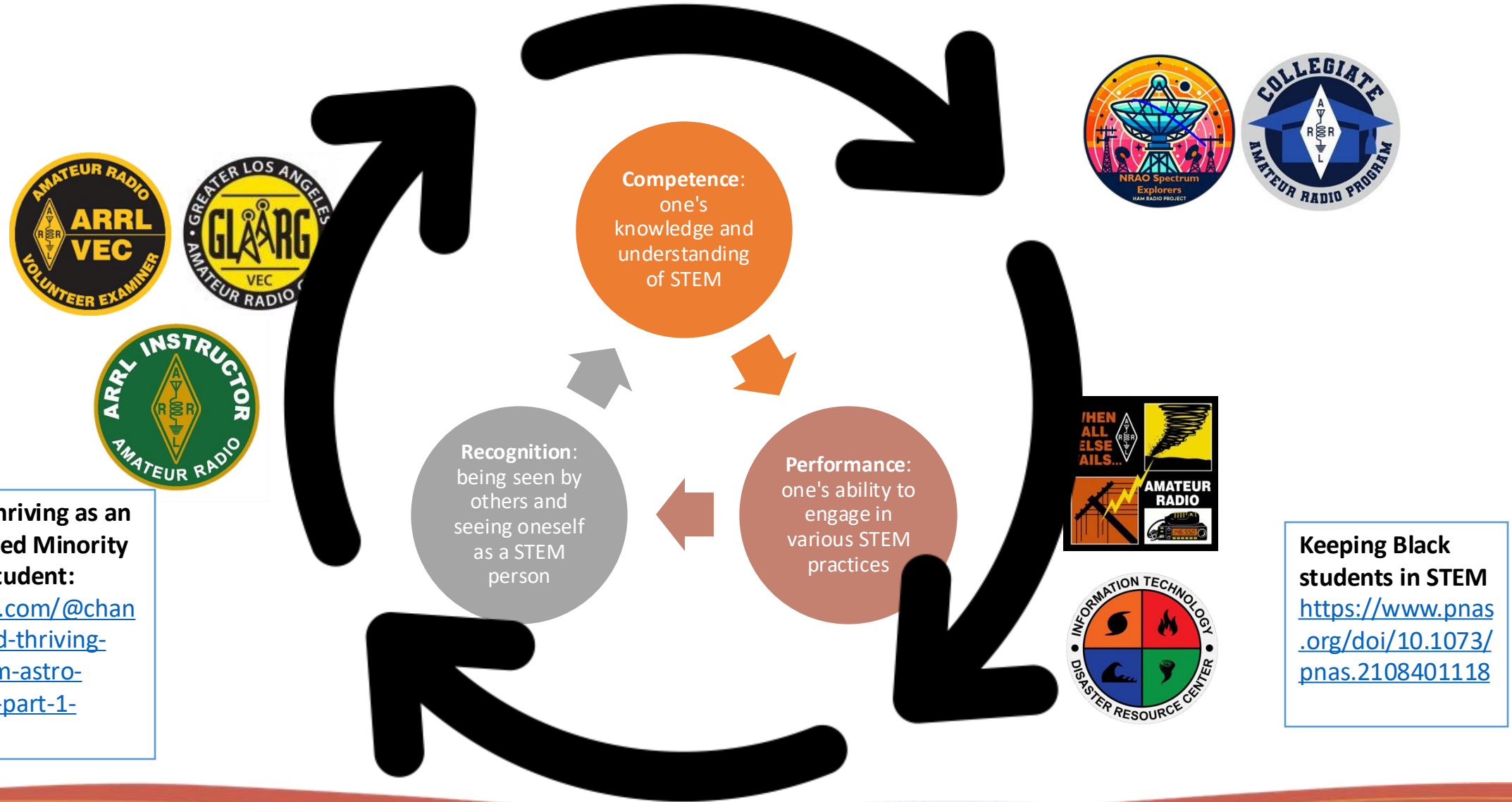
<https://ieeexplore.ieee.org/document/7910230>

Audible Citizenship and Audiomobility: Race, Technology, and CB Radio by Art M. Blake https://www.jstor.org/stable/41237565?seq=1&cid=pdf-reference#references_tab_contents

#HamEquity is a major STEM identity barrier.



Creating Ubuntu (community) to sustain our learners STEM identities



Ham radio is a unique cross-generational co-learning opportunity for BIPOC/LGBTQIA Folk.

"It's the \$60,000 question: How do we get the kids involved?" says Howard Michel, former CEO of the [American Radio Relay League](#) (ARRL).

NRAO Ham
Radio project

Every generation cited
**"I can't find opportunities to work
with people of other generations"**
as a top obstacle.

FINDING 5

Despite strong interest in working across generations, fully half of respondents cited a range of obstacles preventing them from acting on it.

→ SEE MORE ON PAGE 10

It's a stark contrast given the economic value placed on frequency rights. **More than 100 bandwidth auctions over the last 30 years have netted about US \$280 billion for the U.S. Treasury.** And as

SpaceX and Disney's Super-Snady war for the World Or, why three billionaires are girding for battle over spectrum supremacy—and why it matters

BY MICHAEL SOROKIN | 15 JUL 2022 | 3 MIN READ |

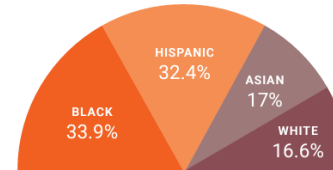


Amazon Fires Up Its Space Lasers
Civilian Satellites Descend Into Very Low Earth Orbit
Satellite-Sharing Enables Low-Cost Earth Observation

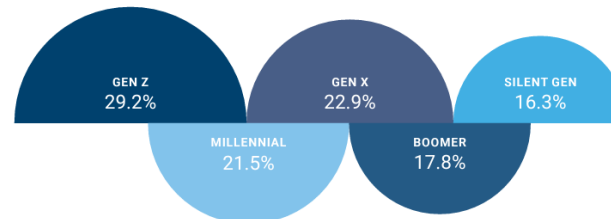
FINDING 2

While interest is widespread, young people, and Black and Hispanic people of all ages, are especially keen to work across generations.

→ SEE MORE ON PAGE 5



Percentages "much more likely" to step up if opportunities are cogenerational, by race and by age

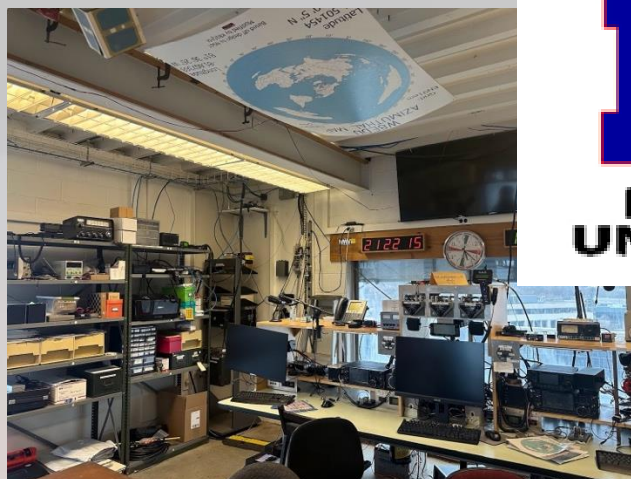
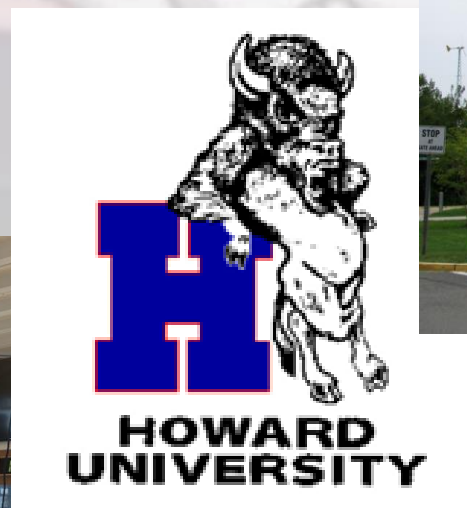


From: The Uncertain Future Of Ham Radio: <https://spectrum.ieee.org/ham-radio>

From Encore.org. (2022). Cogeneration: Is America Ready to Unleash a Multigenerational Force for Good?
www.encore.org/cogeneration



This is my (secret) plan for world domination.



*What
questions do
you have?*

Introductions

Who is Jesse (he/him)

Name: Jesse Alexander, M.Eng.EE

Current role: NRAO Ham Radio Project Lead

Amateur Radio: Extra Class License, callsign WB2IFS/3

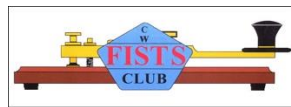
Where I Live: Clinton, MD, USA, Grid Reference FM18ns

What I like to do for fun: Ham Radio, Poetry, Comics, sci-fi movies

Amateur Radio sub-hobbies: Emergency Communications, POTA, hacking electronics, CW, digital communications (DMR, APRS, FT8, etc.)



<https://superknova.org/ham-radio-project/>



My VCard

Acknowledgments and Thanks

NRAO ODI Team

- Jennifer Bates, RADIAL Lead, MHFA Trainer
- Valarie Bogan, SuperKnoVA/Curricula Lead
- Anja Fourie, Broader Impacts Lead
- Jamie Howard, Senior eLearning Specialist
- Danielle Rowland, ODI Student Programs Lead
- Lyndele Von Schill (She/Her), Director of Diversity & Inclusion



Empowering the future
of amateur radio and
digital communications

Acknowledgments and Thanks

Project Advisors

- Winston Benally, KI5BSR, ALMA BE Lead
- Marty Bloss, AD8FF, Engineer
- Rich Bradley, W4DZC, Engineer for the ALMA Correlator Projects.
- Victoria Catlett, Software Engineer I
- Dr. Chris De Pree, Deputy Spectrum Manager, NRDZ Project Director
- Joe Greenberg, KJ4PE, Engineer for the ALMA Correlator Projects.
- Kevin O. Shoemaker, KB0KJH, Engineer
- Danielle Werts, KB3SEI, Front End



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- Steve Goodgame, K5ATA, Education and Learning Manager ARRL, The National Association for Amateur Radio®
- Ria Jairam, N2RJ, ARDC Board member, Vlogger
- Bill Liles, NQ6Z, HamSCI Community Diversity Recruitment Chair
- Dan Romanchik, KB6NU, Instructor for the first wave General Class



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73 (Best Wishes)

May the Stardust in ME

Love

the Stardust in YOU

www.revdele.com

