

# The NRAO Exploring the Electromagnetic Spectrum/Ham Radio Project: The Way Ahead

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Jesse Alexander, WB2IFS<sup>1,2</sup>, Alia Wofford, KQ4MHB<sup>1</sup>

<sup>1</sup>HamSCI

<sup>2</sup>NRAO

# DISCLAIMER

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“The opinions expressed here are my own and do not necessarily reflect the views of my employer or any affiliated organizations.”

# Take a moment



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



# Agenda

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- NRAO and ham radio have a long and deep connection
- The intersectional potential of Ham radio
- ARDC approached NRAO because of its mission.
- What's Happening with the Ham Radio Project
- Results
- Next Steps under the No Cost Extension
- The three primary lessons learned.
- What questions do you have?
- 73s & TNX

# NRAO and ham radio have a long and deep connection



Grote Reber, Radio Astronomy Pioneer, Dies, <https://public.nrao.edu/news/grote-reber-radio-astronomy-pioneer-dies/>

# The intersectional potential of Ham radio

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

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



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## Grant: NRAO – Why Ham Radio Matters

Date: May 2022  
Amount: \$315,123

With this project, the National Radio Astronomy Observatory (NRAO) aims to meet the challenge of educating emerging generations about the electromagnetic spectrum through an interactive, substantive experience with amateur radio, with

Bringing together the expertise of the NRAO, its cadre of amateur radio enthusiasts, Piedmont Virginia Community College (PVCC), and additional enthusiasts and subject matter experts, the goal of this two-year project is to:

1. Introduce two cohorts of students to radio technologies.
2. Develop a scalable curriculum to be shared nationwide (and internationally).
3. Engage a new generation of students in hands on activities that will deepen their subject knowledge.
4. Help students obtain their Technician and General Class amateur radio licenses.

For more information on the NRAO, visit <https://www.nrao.edu>.

Amateur Radio Digital Communications (ARDC) is a private foundation that exists to support amateur radio and digital communication science and technology. We do this through making grants (including support for scholarship programs and research & development projects) and managing 44Net.

For more information, email us anytime: [contact@ardc.net](mailto:contact@ardc.net).

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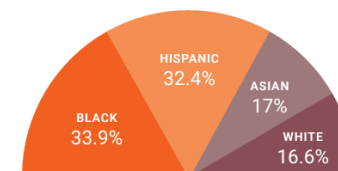
From: The Uncertain Future Of Ham Radio: <https://spectrum.ieee.org/ham-radio>

From Encore.org. (2022). Cogeneration: Is America Ready to Unleash a Multigenerational Force for Good? <https://cogenerate.org/research/cogeneration/>

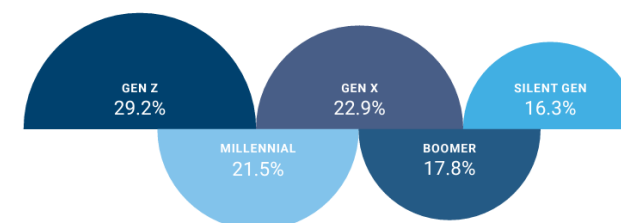
## FINDING 2

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



# ARDC approached NRAO because of its mission.



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### Grant: NRAO – Why Ham Radio Matters

Date: May 2022  
Amount: \$315,123

With this project, the National Radio Astronomy Observatory (NRAO) aims to meet the challenge of educating emerging generations about the electromagnetic spectrum through an interactive, substantive experience with amateur radio, with particular focus on broadening the excitement of amateur radio among BIPOC and LGBTQIA+ students.

Bringing together the expertise of the NRAO, its cadre of amateur radio enthusiasts, Piedmont Virginia Community College (PVCC), and additional enthusiasts and subject matter experts, the goal of this two-year project is to:

1. Introduce two cohorts of students to radio technologies.
2. Develop a scalable curriculum to be shared nationwide (and internationally).
3. Engage a new generation of students in hands on activities that will deepen their subject knowledge.
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## Broader Impacts

### What is Broader Impacts?

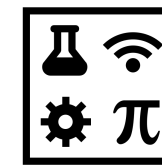
The design, construction, operation and decommissioning of each NRAO facility presents unique opportunities for the Observatory to drive positive change that will benefit society, or have broader impacts, beyond the groundbreaking astronomy research for which it has been designed.

The NRAO strives to be an Observatory respected as a leader in the responsive, innovative and ethical way we use our scientific research to benefit society. Broader impacts is therefore an integral aspect of our organizational culture, as well as a design requirement for each project to ensure its potential to drive positive change for society is re-searched, considered and incorporated.

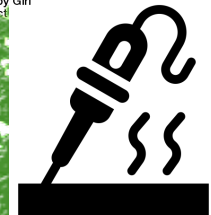
<https://public.nrao.edu/broader-impacts/>

<https://www.ardc.net/apply/grants/2022-grants/grant-nrao-why-ham-radio-matters/>

# What's Happening with the Ham Radio Project



AY2022-23:  
10 learners —  
“Wave one”  
**Complete**



Created by Andre Buand  
oun Project



Created by Claire Jones  
from Noun Project



\$315

Ham Radio



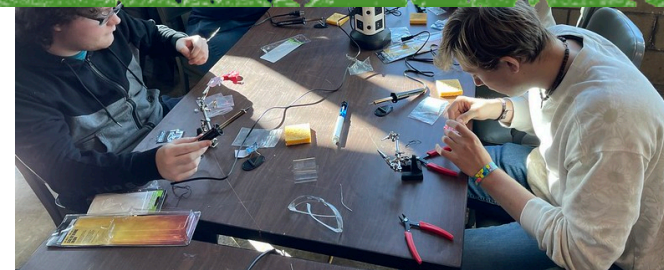
3 Technicians

# COMPLETED

20 learners —

**Complete**

New licensees:  
5 General,  
5 Technicians

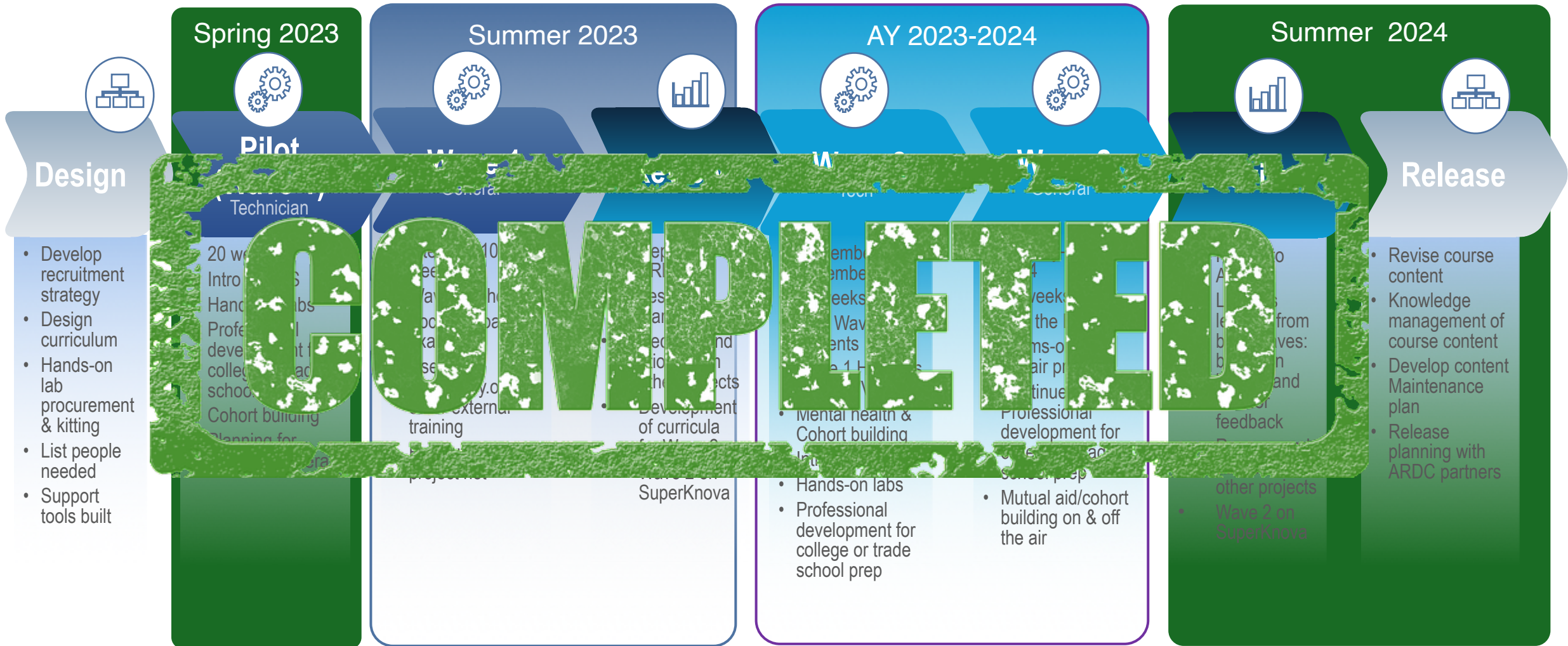


## Curriculum released!

HamSCI  
<http://hamsci.org>

# What's happening with the Ham Radio Project

## Timeline



# What's happening with the Ham Radio Project

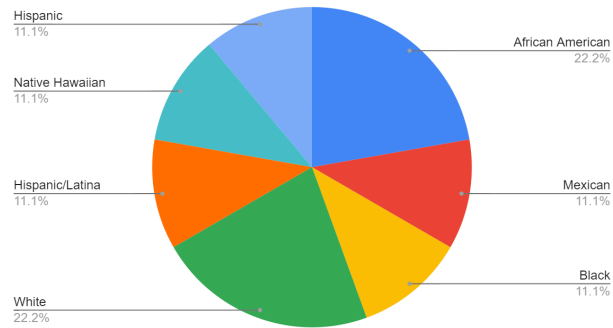
## Timeline



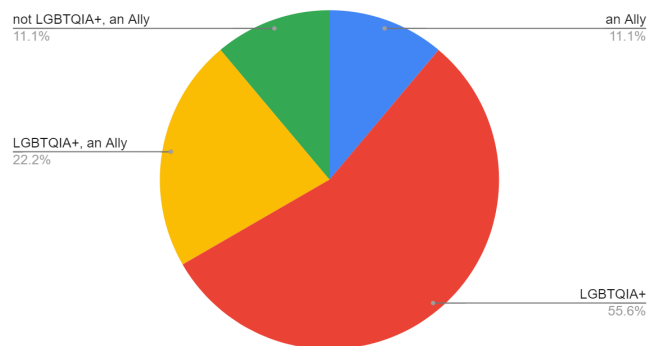
# Results: What happened with the first cohort?

## Wave 1

Count of Race and/or ethnicity



Count of IDENTIFIES AS



Field trip

10 slots

9 selected

6 took the exam

5 passed & licensed

2 upgraded General

44% attrition

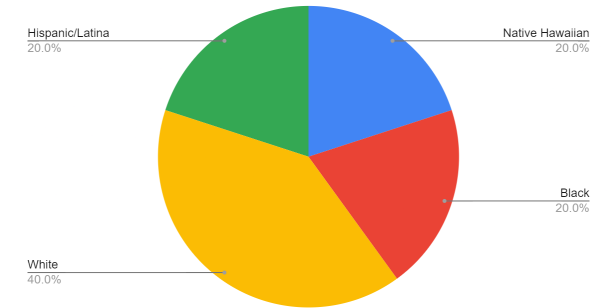
60% attrition

3 from Agnes Scott via connection with NRAO employee

1 from PVAM via connection with NRAO employee

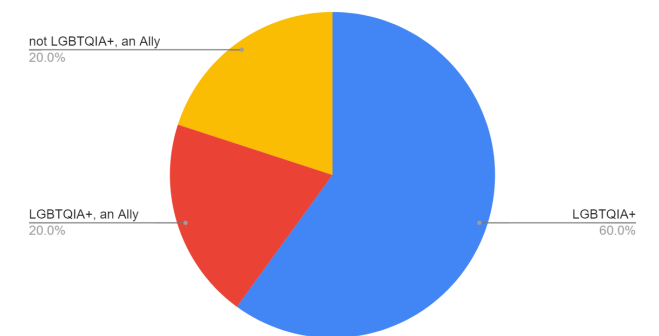


Count of Race and/or ethnicity LICENSED



1 Black, Male & LGBTQIA+  
1 White, nonbinary & LGBTQIA+  
(offered Extra license support as teaching assistant in Wave 2)

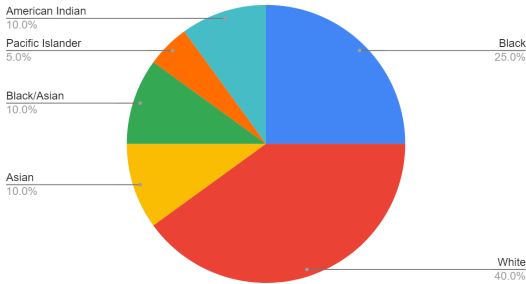
Count of IDENTIFIES AS...LICENSED



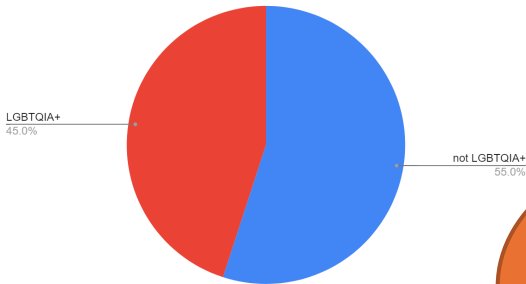
# Using lessons learned: better diversity in wave 2 and more licensees

## Wave 2

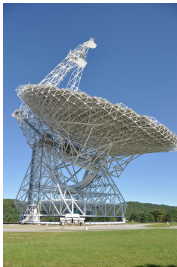
Wave 2. Race and/or ethnicity



Wave 2. Identity



No BIPOC Learners could attend because of exams!



GBO trip

HamSCI

Poster & Briefing

20 slots

17 selected (1 licensed, 1 returning as TAs)

10 passed & licensed

5 Upgraded General

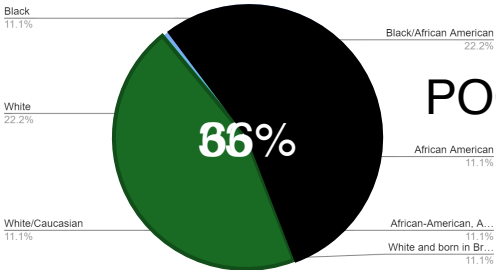
2 from the College of W&M via recommendation from Wave1

4 from HBCUs: 3 Howard & 1 Hampton

41% attrition

30% attrition

Count of Race and/or ethnicity LICENSED

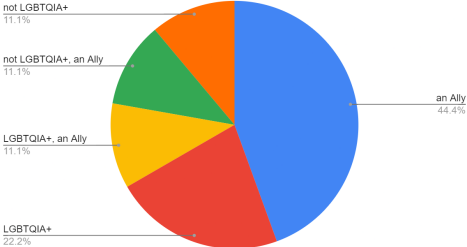


POCs

66%

- 1 African-American & Asian-American, male, Ally
- 1 White/Caucasian , Female, LGBTQIA+
- 1 White/Caucasian , Agender, LGBTQIA+, an Ally
- 1 White/Caucasian , Non-Binary , LGBTQIA+, an Ally
- 1 White/Caucasian , Genderqueer, LGBTQIA+, an Ally

Count of I identify as (check all that apply) LICENSED:

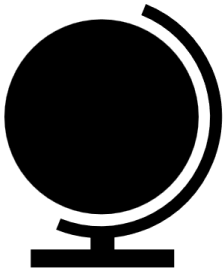


# Next Steps: Club Curriculum pilot: No-Cost Extension (NCE)

No-Cost  
Extension  
thru  
6/30/2025



BOYS & GIRLS CLUBS  
OF CENTRAL VIRGINIA  
Charlottesville, Virginia



Created by Claire Jones  
from Noun Project



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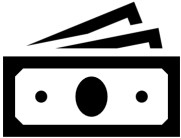


Pasifika  
Knowledge

Pukekohe, Aotearoa, New Zealand

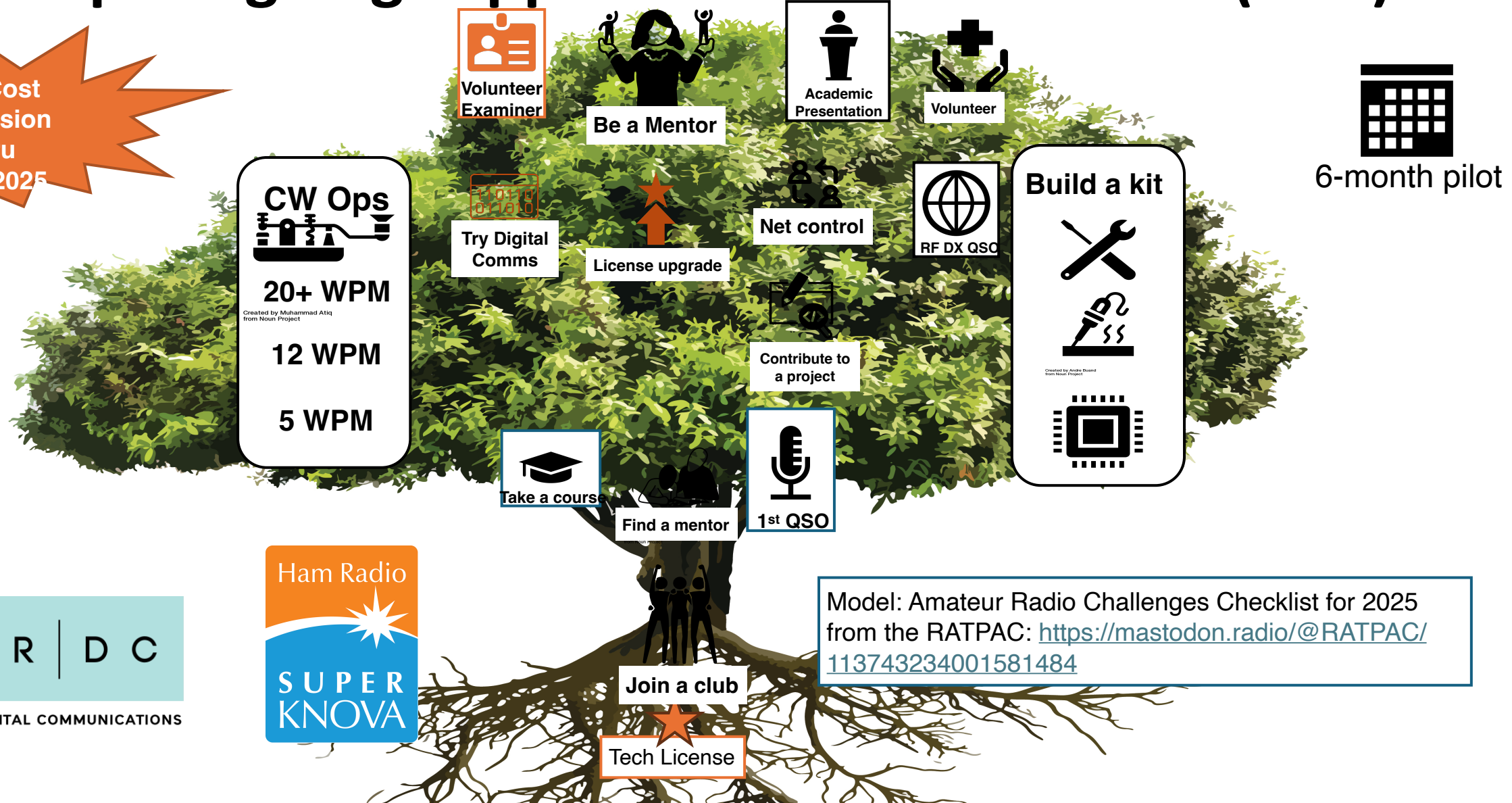


EVERY SIGNAL TELLS A STORY





# Next steps ongoing support: No-Cost Extension (NCE)

No-Cost  
Extension  
thru  
6/30/2025



# Next steps ongoing support: No-Cost Extension (NCE)


 My courses Support Desk Site administration



## NRAO Spectrum Explorer's Club


Course Information Participants Question bank Badges

### Introduction

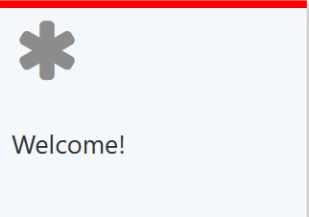


The Spectrum Explorer's Club is a game for the alumni of the **NRAO Ham Radio Project**, allies, advisors, and supportive **National Radio Astronomy Observatory** personnel. Playing the game connects you with people in the hobby and helps you create your own place in amateur radio.

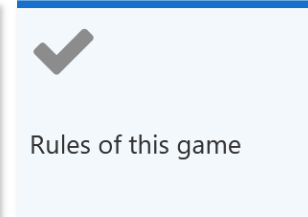
Time in UTC: 16:11

 My courses Support Desk Site administration


Overall progress % 0



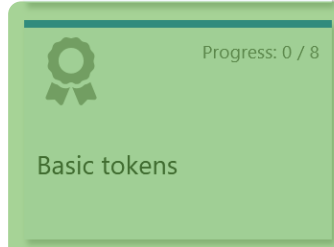
Welcome!



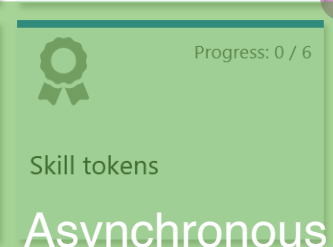
Rules of this game



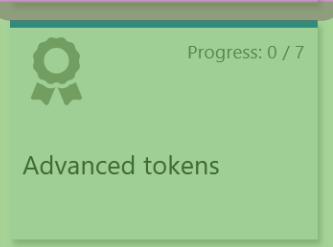
Synchronous  
Monthly meetings  
Progress: 0 / 6



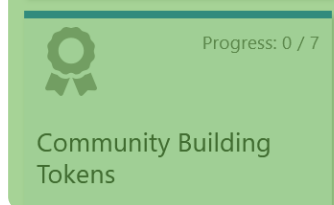
Basic tokens  
Progress: 0 / 8



Skill tokens  
Progress: 0 / 6



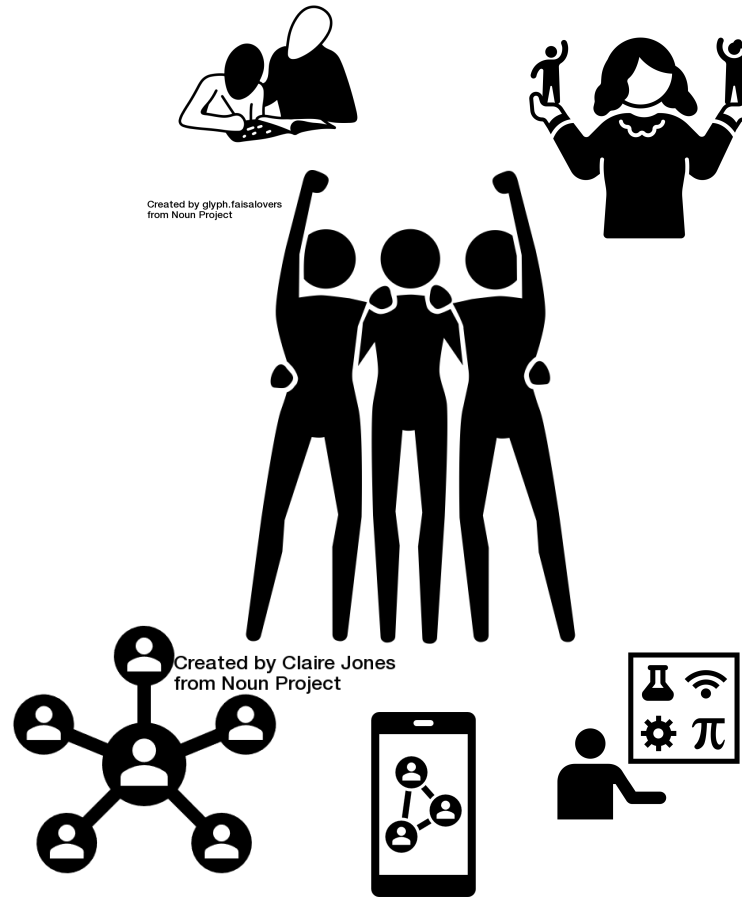
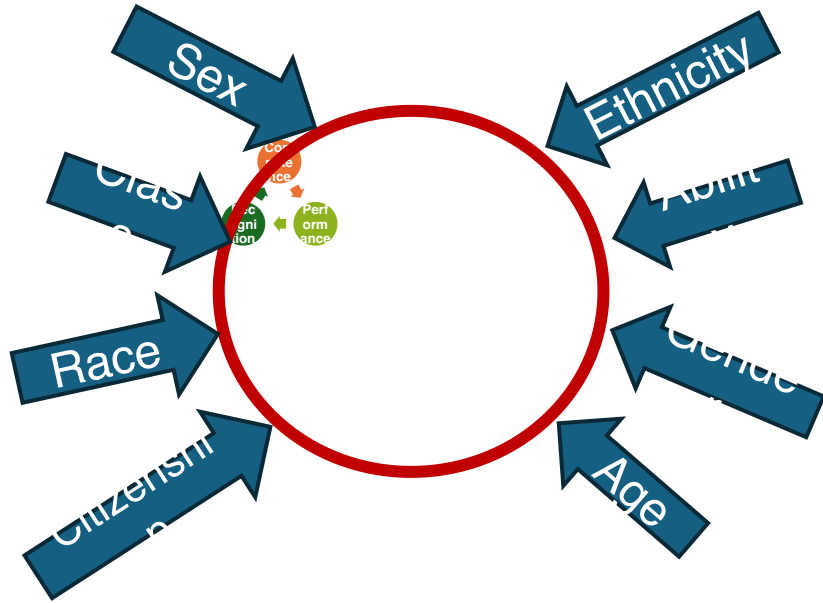
Advanced tokens  
Progress: 0 / 7



Community Building  
Tokens  
Progress: 0 / 7

## Asynchronous

# The three primary lessons learned.



Intersectionality in STEM: <https://successinstem.ca/wp-content/uploads/2019/10/Intersectionality-in-STEM-Final.pdf>

What questions do  
you have?



# Who is Jesse?

**Name:** Jesse Alexander, M.Eng.EE specializing in wireless communications

**Current role:** NRAO Ham Radio Project Lead

**Amateur Radio:** Continuously licensed since 1975, 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.)



# Acknowledgments and Thanks

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## Ham Radio Project Team

- Jennifer Bates, RADIAL Lead, MHFA Trainer
- Dr. Valarie Bogan, SuperKnova/Curricula Lead
- Anja Fourie, Broader Impacts Lead
- Jamie Howard, Senior eLearning Specialist
- Danielle Rowland, ODI Student Programs Lead
- Lyndele Von Schill, KQ4VSB, Director
- Alia Wofford, KQ4MHB, Program Coordinator



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# Acknowledgments and Thanks

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## 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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# Acknowledgments and Thanks

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## Project friends and supporters

- Dr. Nathaniel Frissell, W2NAF, Assistant Professor, Department of Physics and Engineering, University of Scranton
- 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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The [HamSCI Community](#) is led by [The University of Scranton Department of Physics and Engineering W3USR](#), in collaboration with [Case Western Reserve University W8EDU](#), the [University of Alabama](#), the [New Jersey Institute of Technology Center for Solar Terrestrial Physics K2MFF](#), the [MIT Haystack Observatory](#), [TAPR](#), additional collaborating universities and institutions, and volunteer members of the [amateur radio](#) and citizen science communities.

We are grateful for the financial support of the [United States National Science Foundation](#), [NASA](#), and [Amateur Radio Digital Communications \(ARDC\)](#).

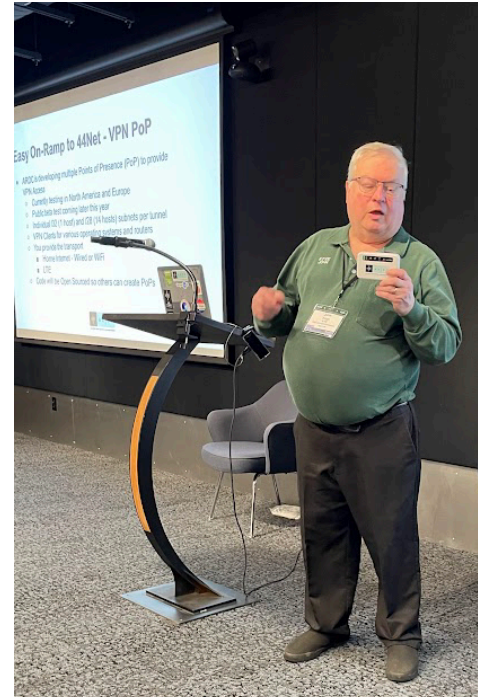
HamSCI silhouette photo by Ann Marie Rogalcheck-Frissell KC2KRQ.

# Dedication

John Hays, K7VE, ARDC Outreach, approached NRAO ODI about the project



Patricia Nelson, KE0QXD, the first guest speaker, OMIK Interim Secretary, volunteer examiner, broadcaster



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# 73 (Best Wishes)



[https://linktr.ee/nrao\\_hamradio](https://linktr.ee/nrao_hamradio)



My VCard



# Thank you!

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# Closure of Observatory DEI activities

**From:** Allemploy <[allemploy-bounces@listmgr.nrao.edu](mailto:allemploy-bounces@listmgr.nrao.edu)> on behalf of Tony Beasley via Allemploy <[allemploy@listmgr.nrao.edu](mailto:allemploy@listmgr.nrao.edu)>  
**Sent:** Friday, January 31, 2025 3:25 PM  
**To:** allemploy <[allemploy@nrao.edu](mailto:allemploy@nrao.edu)>  
**Subject:** [allemploy] Closure of Observatory DEI activities

To all NRAO/GBO employees:

In response to White House Executive Order 13985, and a formal directive received from the National Science Foundation on January 28<sup>th</sup>, AUI and NRAO will immediately halt all DEI specific and related activities across the Observatory. All staff previously assigned to the Office of Diversity and Inclusion (ODI) no longer have DEI activities as part of their portfolio, and have been reassigned to unrelated activities. Changes effective immediately (based on our review of the guidance provided):

- The Office of Diversity and Inclusion situated in the NRAO Director's Office is immediately closed.
- The National Astronomy Consortium (NAC) program and National and International Non-Traditional Exchange (NINE) programs are canceled.
- NRAO's participation in several externally-led programs (LSAMP, CARSE) will be immediately discontinued.
- The DEI components of Project RADIAL and SuperKnoVA will be immediately discontinued. DEI requirements in any NRAO subawards will be withdrawn.
- Other key programs (ngVLA, NRDZ, Radar, SpectrumX, Cosmic AI) will continue their proposed activities without any proposed DEI components or considerations.
- Across NRAO's websites, all DEI materials will be removed, including the NRAO mission statement section.
- DEI requirements in performance, recruiting, on-boarding, codes of conduct, and other employee activities will be removed, and supporting information deleted.
- The NRAO Employee Diversity Group will no longer be officially supported.
- DEI-related activities in Chile will be halted (subject to international partnership agreements and local Chilean law). ~~A handful of small privately-funded DEI activities (Ham Radio, Sloan Foundation, Women in Science, etc.) will be reviewed for future funding.~~ State-funded DEI activities in NM and WV are being reviewed, but will not be partially supported in future by Federal funds.
- All NRAO awards, proposals and supplementary agreements will be reviewed for DEI components, and activities/funding modified to remove them.
- The ODI Speaker series is cancelled

~~All changes are planned to be completed by February 5th. Additional actions may be required as further information is provided.~~

If you have questions or comments, please contact your supervisor, Department head or me.

Tony Beasley

# Radio and space is a BIPOC place

