



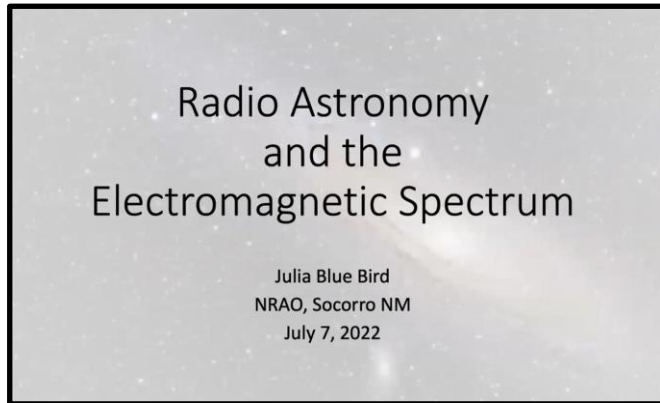
The Role of Major and Midscale Research Infrastructure in Fueling the US STEM Workforce Pipeline – PreK-12

Valarie Bogan - NRAO



I. Provide Content Knowledge

- Teachers need support
- Workshops by industry experts
- Potential addition
 - Asynchronous professional development on Superknova



MIT HAYSTACK OBSERVATORY

University of Colorado Boulder

Meteor Radar

Ryan Volz¹ John Marino² Scott E. Palo²

¹MIT Haystack Observatory
²University of Colorado Boulder

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Teachers Workshop

Zonal wind (m/s) Altitude (km)

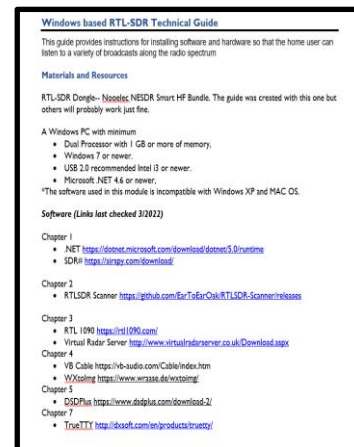
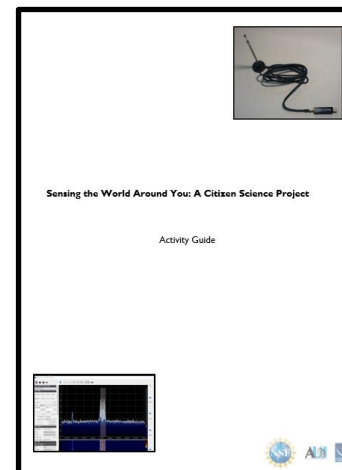
2. Provide Assess to Lessons on Content

- Must be engaging and inquiry based
- Curriculum creation
 - 3 lessons developing basic knowledge of the electromagnetic spectrum
 - 6 inquiry lessons using an RTL-SDR dongle
 - 20 lessons about radio frequencies
- Superknova: A virtual repository

| | |
|--|--|
| Lesson | Investigating Spectrum Users |
| 5 | |
| Time Required | Lesson Summary |
| 100 minutes (2 – 50 minute class periods) | During this lesson students will see the radio waves that are passing through their areas visualized on the screen in the classroom. Students will work in small groups to identify the broadcasters of these waves. Lastly, students will work independently to write a persuasive essay about how the spectrum should be shared among users. |
| Standards Addressed | |
| NGSS | |
| <ul style="list-style-type: none">○ HS-PS4-5 Waves and electromagnetic Radiation. Students who demonstrate understanding can communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.○ PS4.C Information Technologies and Instrumentation.<ul style="list-style-type: none">▪ Multiple technologies based on the understanding of waves and their interactions with matter are part of everyday experiences in the modern world and in scientific research. They are essential tools for producing, transmitting, and capturing signals and for storing and interpreting the information contained in them. | |
| Virginia | |
| <ul style="list-style-type: none">○ PH.5.b The students will investigate and understand that waves transmit energy and move in predictable patterns. Students will realize that wave interactions are part of everyday experiences and identify technological applications of the radio wave portion of the spectrum.○ English 10.6 The student will develop a variety of writing to persuade, interpret, | |

3. Provide Ways for Students to Explore

- Citizen science project
- Ham radio course
- Potential addition
 - Turn undergraduate courses into digital badges for HS students



4. Introduce Students to Potential Careers

- Fill the need
- Workshops by industry experts
- Potential addition
 - Create a guide to radio frequency spectrum careers





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*The National Radio Astronomy Observatory is a facility of the National
Science Foundation
operated under cooperative agreement by Associated Universities, Inc.*