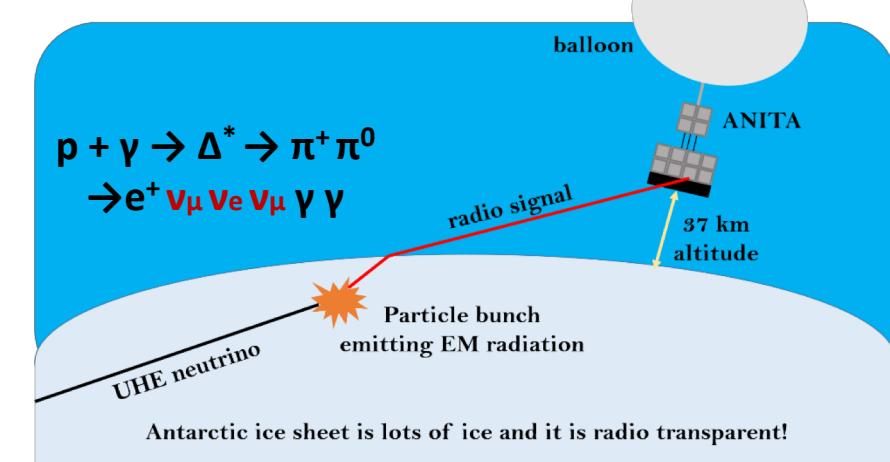


# Astroparticle Experiments at OSU

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Welcome! At OSU we work on several Astroparticle Experiment projects including **IceCube**, **ANITA**, **ARA**, **T576**, and **HELIX**! They all look for high-energy particles of galactic, astrophysical or cosmogenic origins. All of these projects are highly collaborative efforts. Here at OSU, we are involved in all aspects of each experiment: hardware, simulation and analysis.



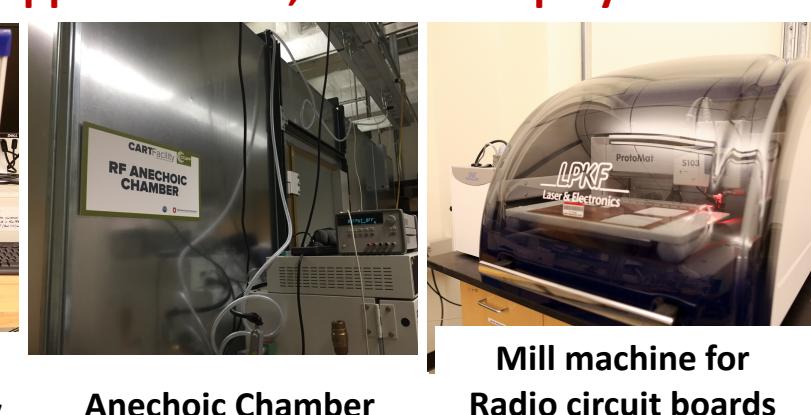
Above is a cartoon showing Askaryan radio detection of theorized ultra-high-energy (UHE) neutrinos

## Why Antarctica?

- Has lots of ice for neutrinos to interact in and produce optical Cherenkov (IceCube) and radio Cherenkov (ANITA, ARA) light.
- It is radio-quiet compared to rest of the world so less noisy for radio experiments.
- Summer polar vortex allows balloon-borne ANITA and HELIX to fly in circles over the continent and stay at constant altitude. ANITA observes  $\sim 1$  million  $\text{km}^3$  of Antarctic ice.



CART: We are well-equipped to build, test and deploy!



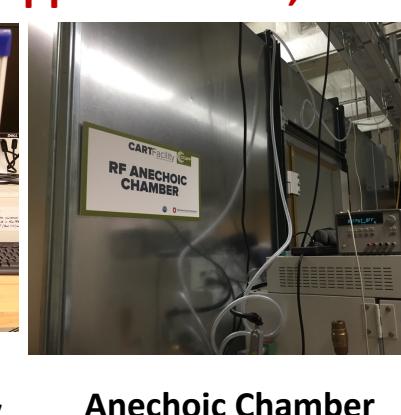
Mill machine for Radio circuit boards



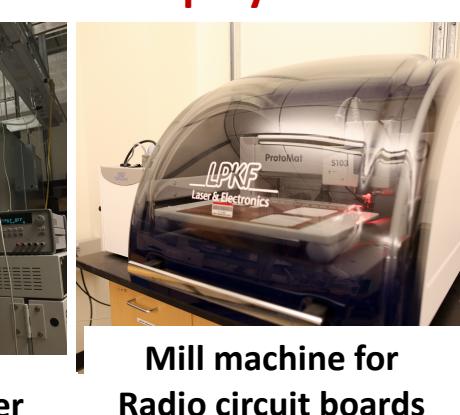
Large thermal chamber for rapid thermal testing



Pick & Place Machine for rapid mass assembly

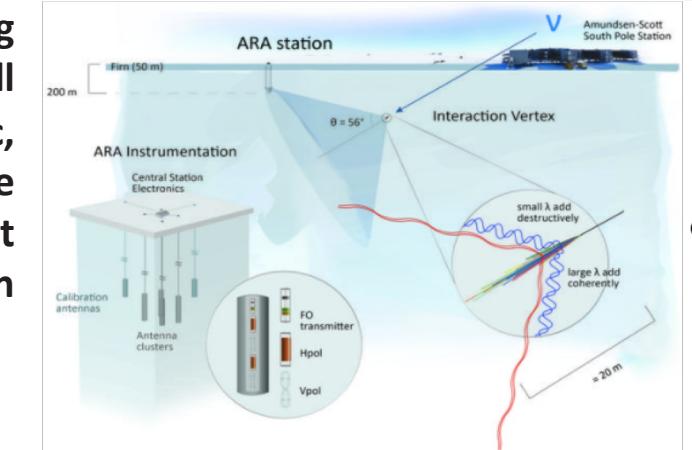


Anechoic Chamber

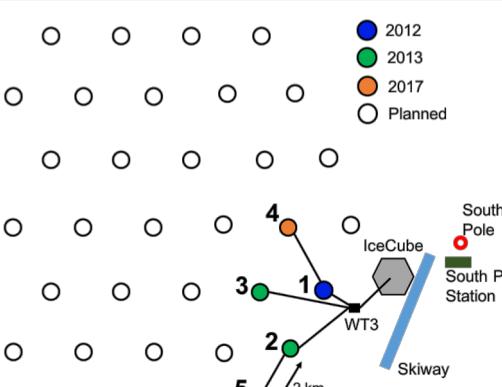
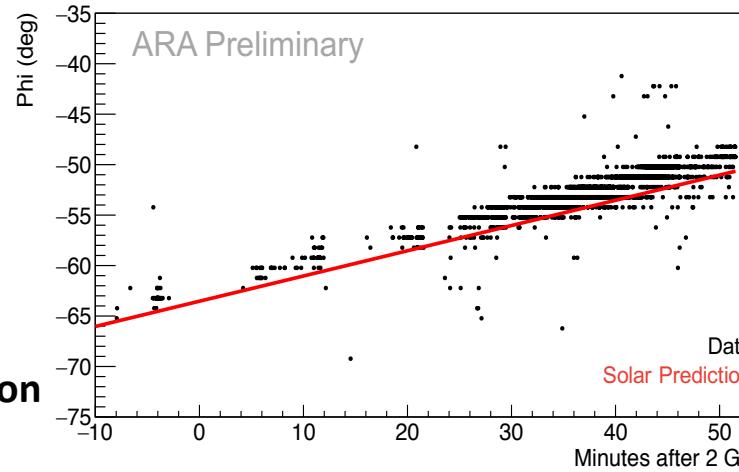


Mill machine for Radio circuit boards

## Askaryan Radio Array (ARA)

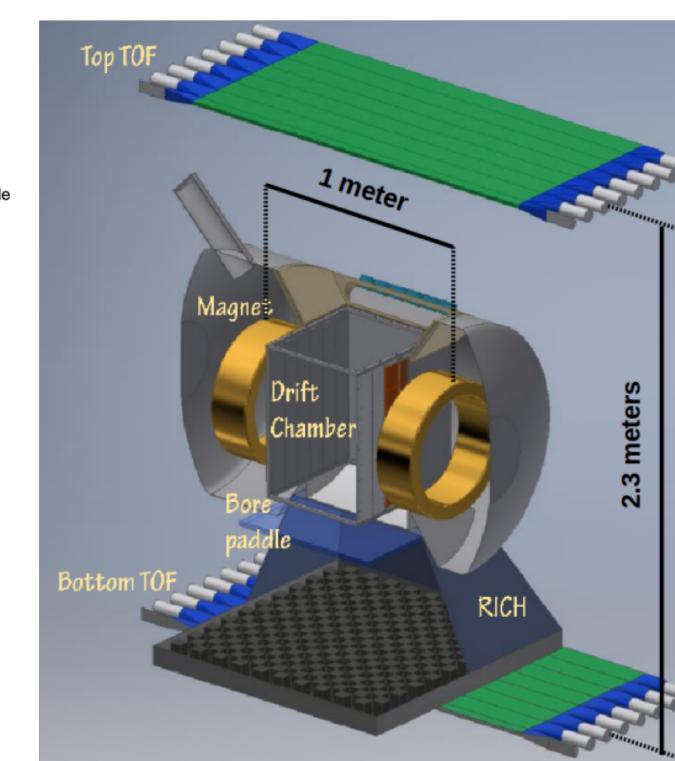


ARA observes Solar Flares

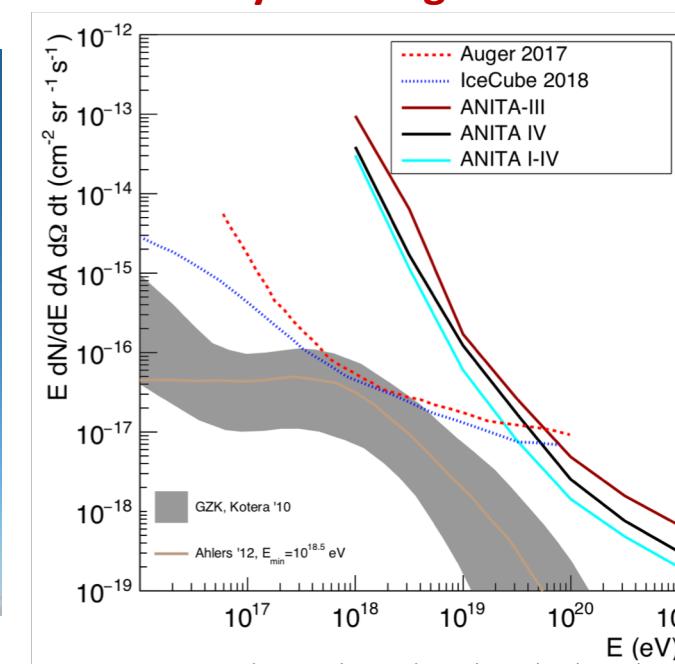


OSU builds the HELIX master trigger boards

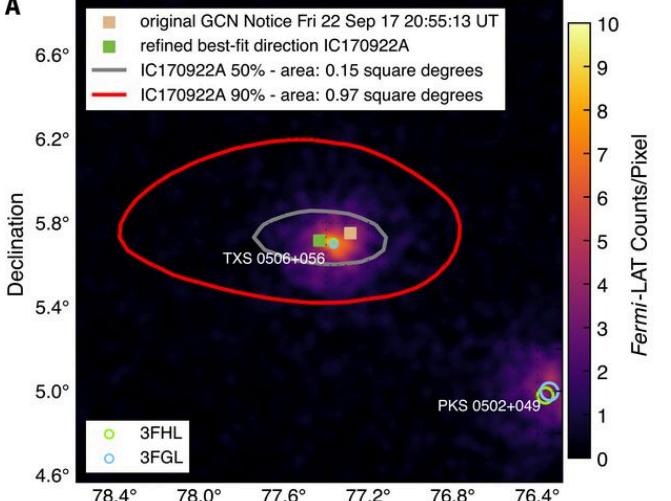
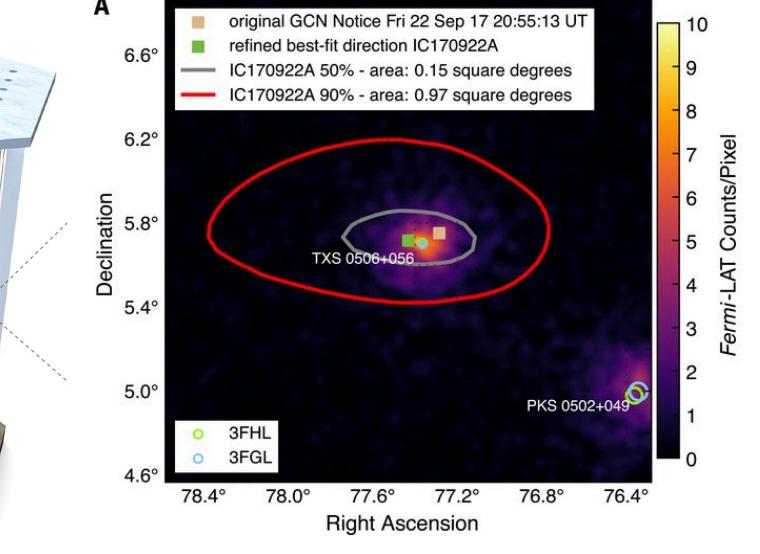
## HELIX: High Energy Light Isotope eXperiment



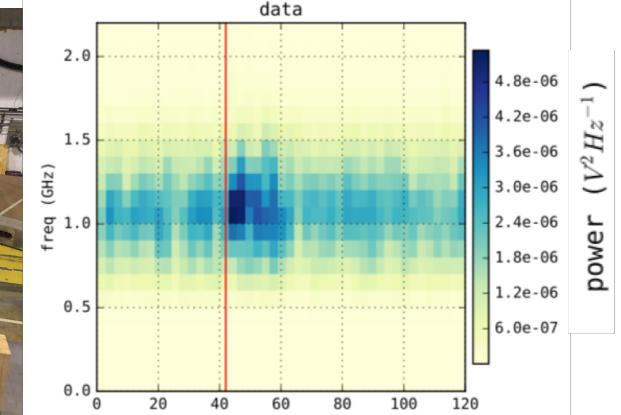
ANITA dominates Neutrino Astronomy at energies  $> 10^{19}$  eV



## IceCube, 1 km³ neutrino observatory at the South Pole, observes neutrino from flaring blazar



T576 experiment fires electrons at target at SLAC, looking for radar reflections off generated plasma



Genetic Programming



## DEPARTMENT OF PHYSICS

# ASPIRE



<http://u.osu.edu/aspire/>

## CURRENT GRAD STUDENTS

CONNOLY GROUP: Brian Clark, Lauren Ennesser, Jorge Torres Espinosa and Julie Rolla  
BEATTY GROUP: Keith McBride and Andres Medina



## CURRENT POSTDOCS/STAFF

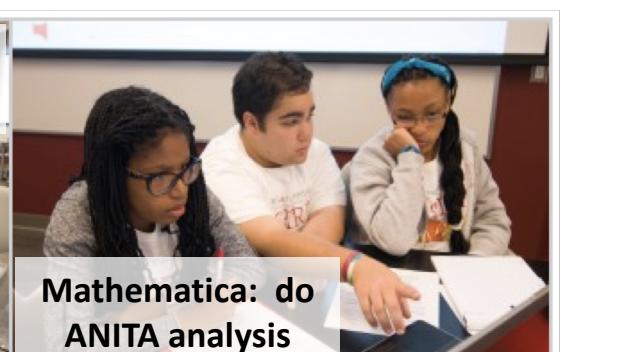
Patrick Allison and Steven Prohira



Oscilloscopes: perform radio interferometry



Arduino: program radios



Mathematica: do ANITA analysis