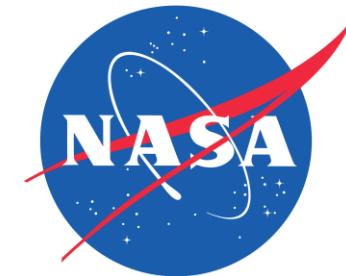
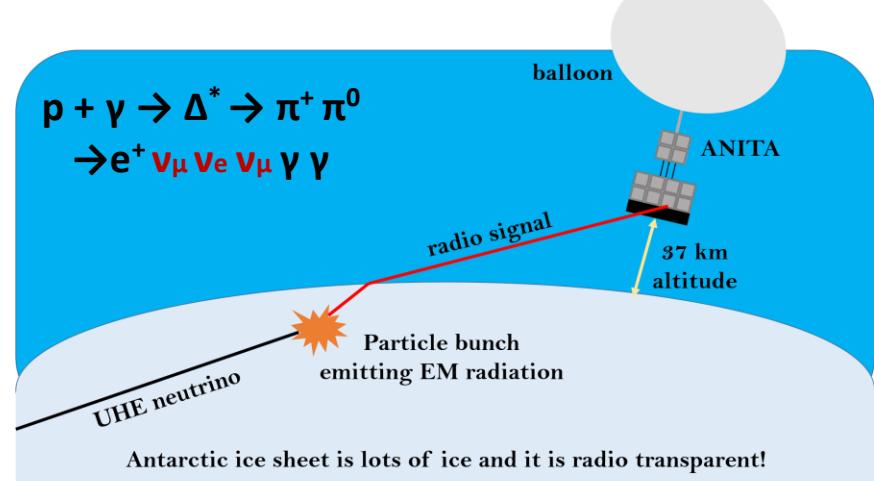


Astroparticle Experiments at OSU

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Welcome! Interested in Multi-Messenger Astroparticle Physics? At OSU we work on several Astroparticle Experiment projects including IceCube, AUGER, ANITA, ARA! They all look for high-energy particles of astrophysical or cosmogenic origins. IceCube has observed the first astrophysical neutrinos! Others have observed cosmic-rays (CR). All of these projects are highly collaborative efforts. Here at OSU, we are involved in multiple aspects of each one, including hardware, electronics, simulation and analysis.



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

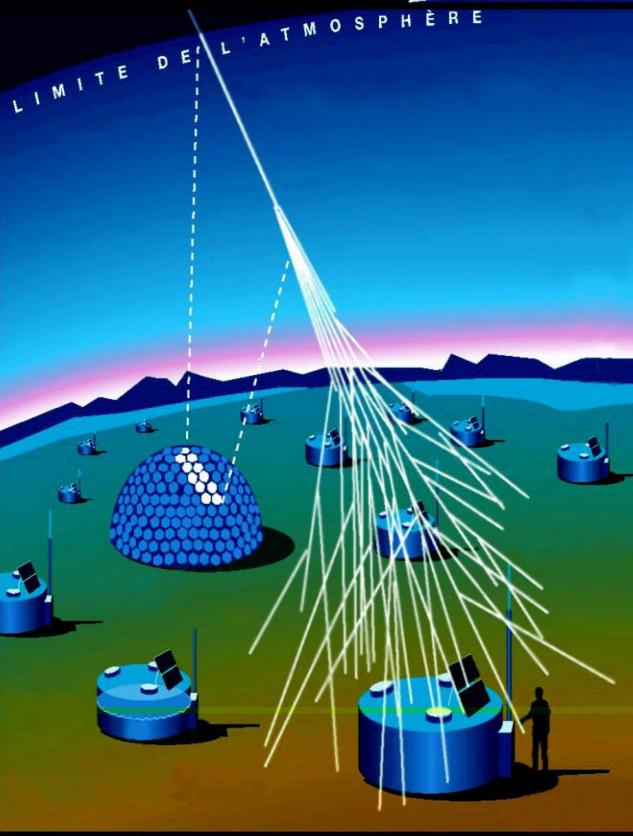
Why Antarctica?

- Has lots of ice (dielectric target medium) 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.
- Earth's magnetic field points straight down giving cosmic-ray signals a distinctive polarization.
- Summer polar vortex allows balloon-borne ANITA to fly in circles over the continent observing ~ 1 million km³ of Antarctic ice for UHE neutrinos.

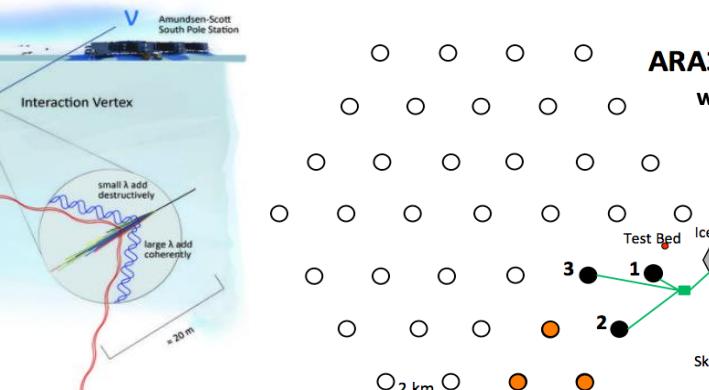
ANITA-4 before launch



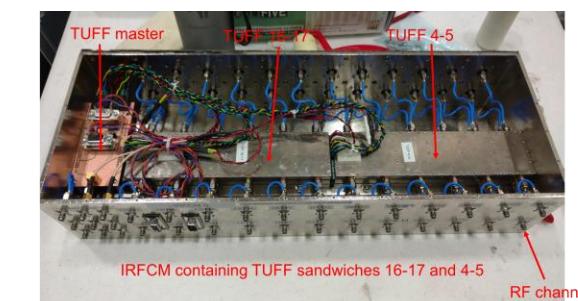
AUGER: Water Optical Cherenkov experiment in Argentina



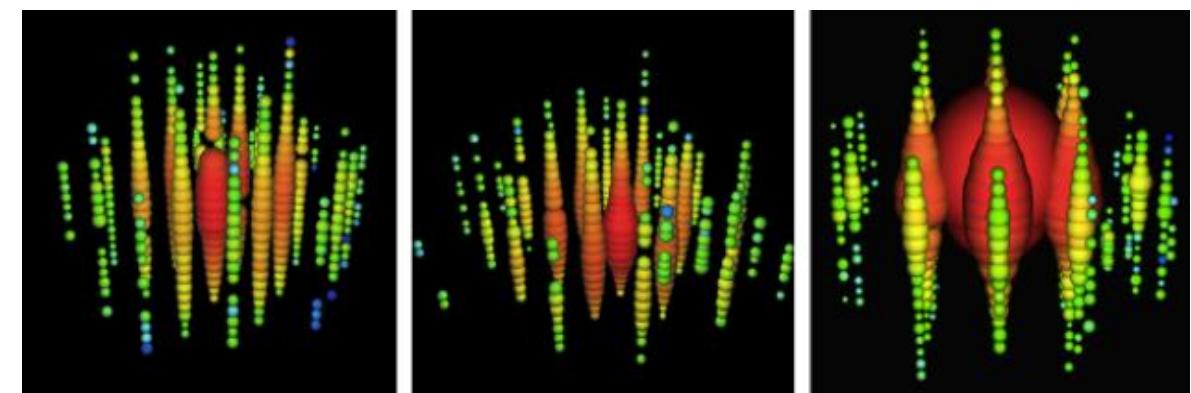
Askaryan Radio Array (ARA)



Tunable TUFF Boards Filter RF Noise

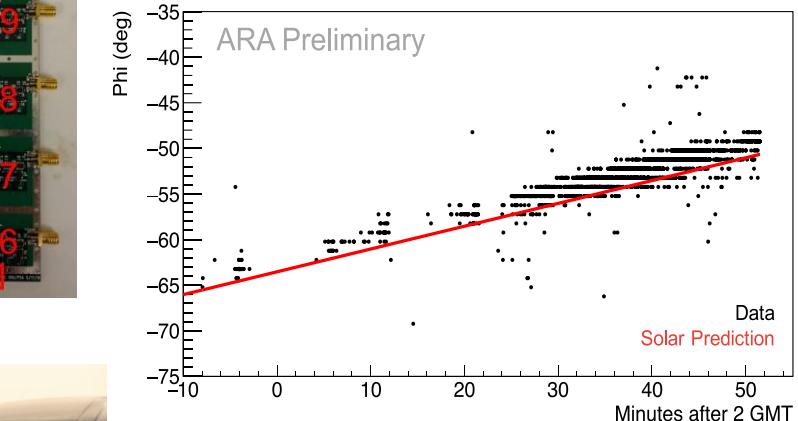


IceCube, 1 km³ neutrino observatory at the South Pole, observes astrophysical neutrinos for the first time!

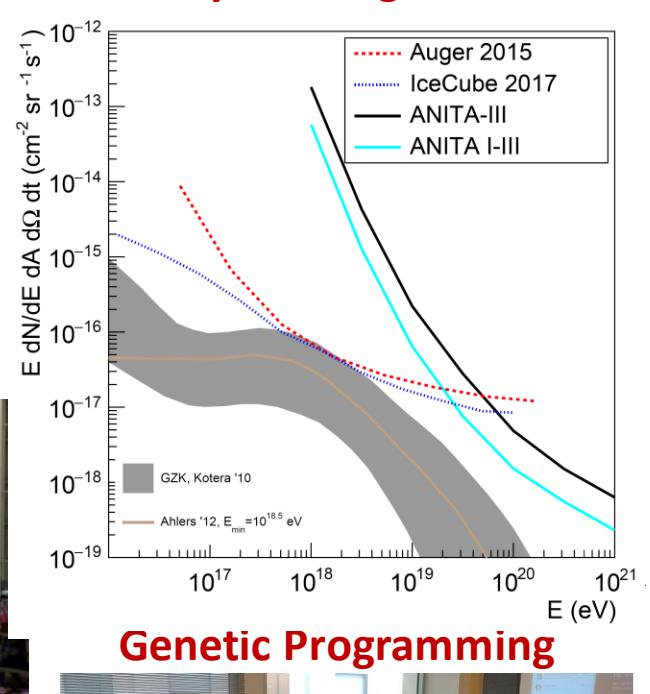


From left to right, Bert, Ernie and Big Bird, with energies of 1.0, 1.1 and 2.2PeV.

ARA observes Solar Flares!



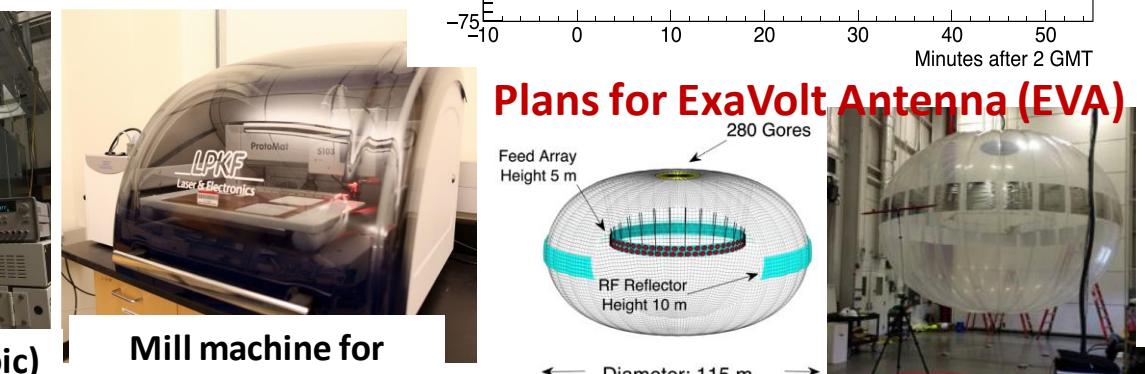
ANITA dominates Neutrino Astronomy at energies > 10¹⁹ eV



Genetic Programming



Plans for ExaVolt Antenna (EVA)



Exploring Machine Learning



ANITA-2 Re-analysis



Our science workshop for high school women funded by NSF | Hands on projects!



CURRENT POSTDOCS/STAFF

Patrick Allison, Carl Pfendner, Steven Prohira, Michael Sutherland,