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Progress Towards Measuring the Ultra-High Energy Neutrino Flux with the Askaryan Radio Array

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Ultra-High Energy (UHE) neutrinos, those with energy greater than 100 PeV, have yet to be observed but are theorized to originate from astrophysical and cosmogenic sources. The Askaryan Radio Array (ARA) is a UHE neutrino observatory located at the South Pole that was built to discover such UHE neutrinos. ARA is composed of 5 stations that are each made up of vertically and horizontally polarized radio antennas installed up to 190 meters deep in the Antarctic glacier. The fifth of these stations has a phased array component that allows for lower threshold observations. Previous ARA measurements have demonstrated the ability to reject anthropogenic backgrounds and set leading limits on the UHE neutrino flux below ~20 EeV as measured by radio experiments thus far. The ARA stations have accumulated more than 30 station-years worth of data, of which only a fraction has been analyzed and published. A concerted effort to analyze the full livetime of data in all of the ARA stations is currently underway, with significant effort from multiple institutions of the collaboration. The search through this data set builds on previous analyses and aims to coordinate analysis strategies across stations to optimize for discovery. This poster summarizes the ARA collaboration's presently ongoing neutrino search of all data taken from 2013 through 2021, which will discover the first UHE neutrino or set the strongest radio limit on their flux in the 1-100 EeV energy range.

Poster prize

Yes

Given name

Abigail

Surname

Bishop

First affiliation

University of Wisconsin - Madison

Second affiliation

Vrije Universiteit Brussel

Institutional email

abigail.bishop@icecube.wisc.edu

Gender

Female

Collaboration (if any)

Askaryan Radio Array

Primary author: BISHOP, Abby (University of Wisconsin Madison)

Presenter: BISHOP, Abby (University of Wisconsin Madison)

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