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Ultrahigh-energy physics from high altitudes with ANITA

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Over the last 15 years, the Antarctic Impulse Transient Antenna (ANITA) collaboration has flown interferometric radio arrays on long-duration balloon payloads over Antarctica. ANITA seeks to detect the Askaryan radio emission produced from interactions of ultrahigh-energy (>1 EeV) neutrinos in the Antarctic Ice Sheet. Above $10^{19.5}$ eV, ANITA sets world-leading limits on neutrino flux.

ANITA is also sensitive to radio emission from extensive air showers. In addition to a number of cosmic ray candidates, ANITA has also detected several events consistent with upward-going air showers. While atmospheric tau decays from energetic tau neutrinos interacting in the Earth could produce such event topologies, the implied rate poses challenges for this explanation. If real, these events could be a hint of new physics.

The successor to ANITA is the Payload for Ultrahigh Energy Observations (PUEO), with hardware improvements and a more sensitive triggering technique to improve on ANITA's sensitivity by more than an order of magnitude at 10^{19} eV. PUEO is expected to launch in 2024.

Primary author: DEACONU, Cosmin (University of Chicago)

Presenter: DEACONU, Cosmin (University of Chicago)

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