

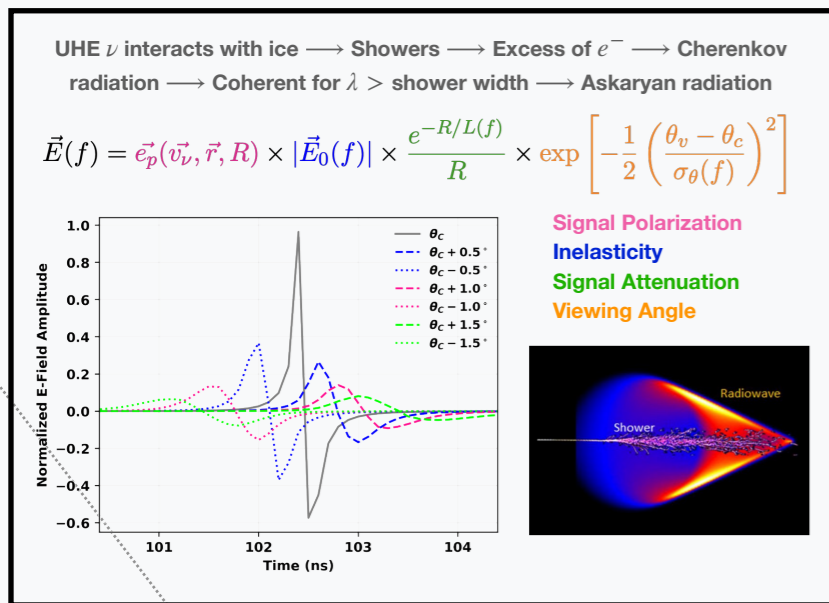
A Diffuse Search for Ultra-High Energy Cosmogenic Neutrinos with

¹Mohammad Ful Hossain Seikh[†] & ²Pawan Giri for the

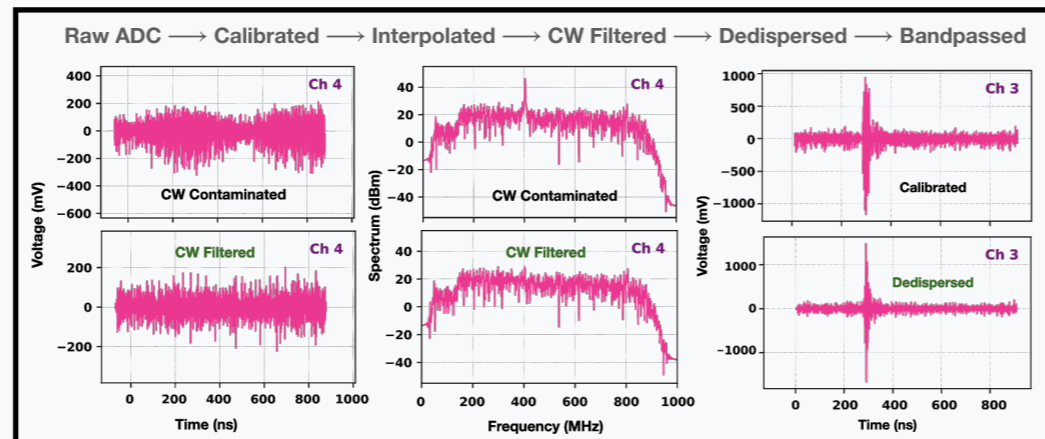


Five Stations Collaboration

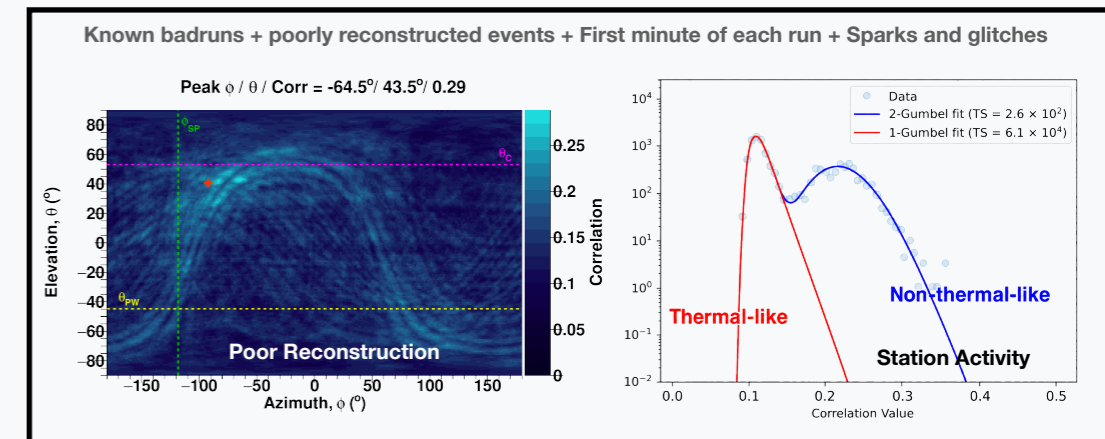
Askaryan Radiation



Waveform Preprocessing

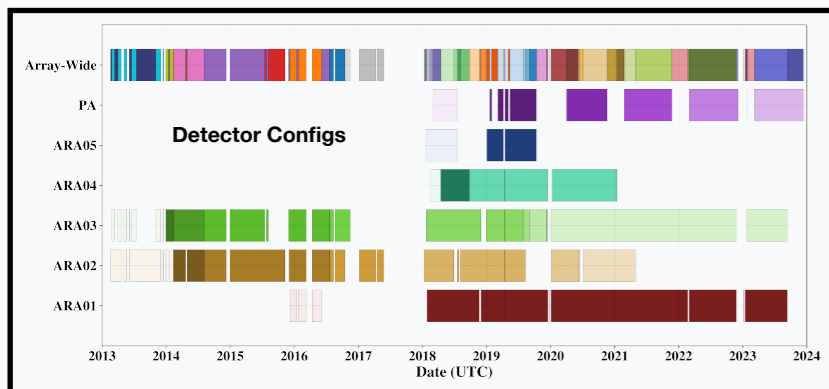


Quality Cuts

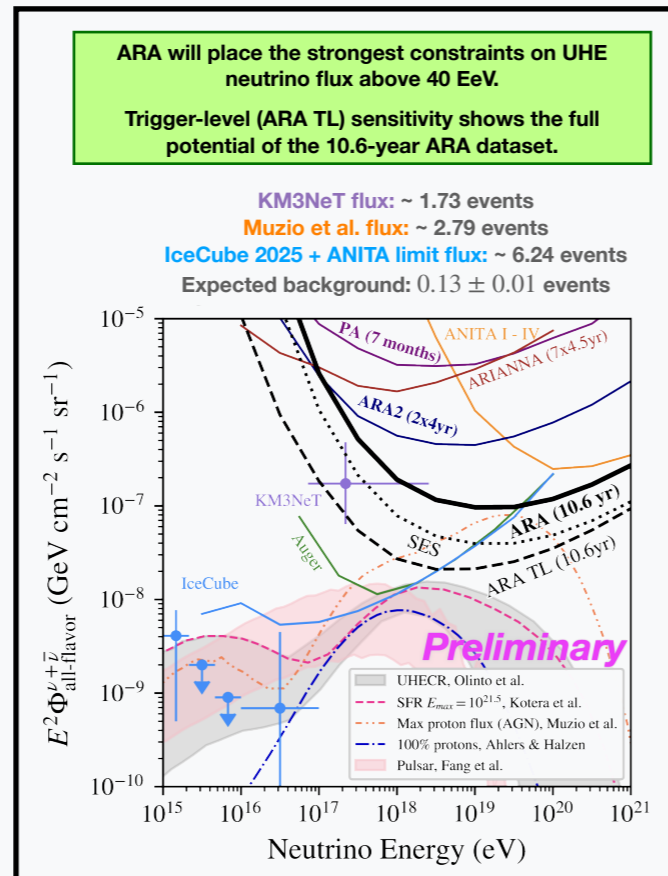


ARA Stations Overview

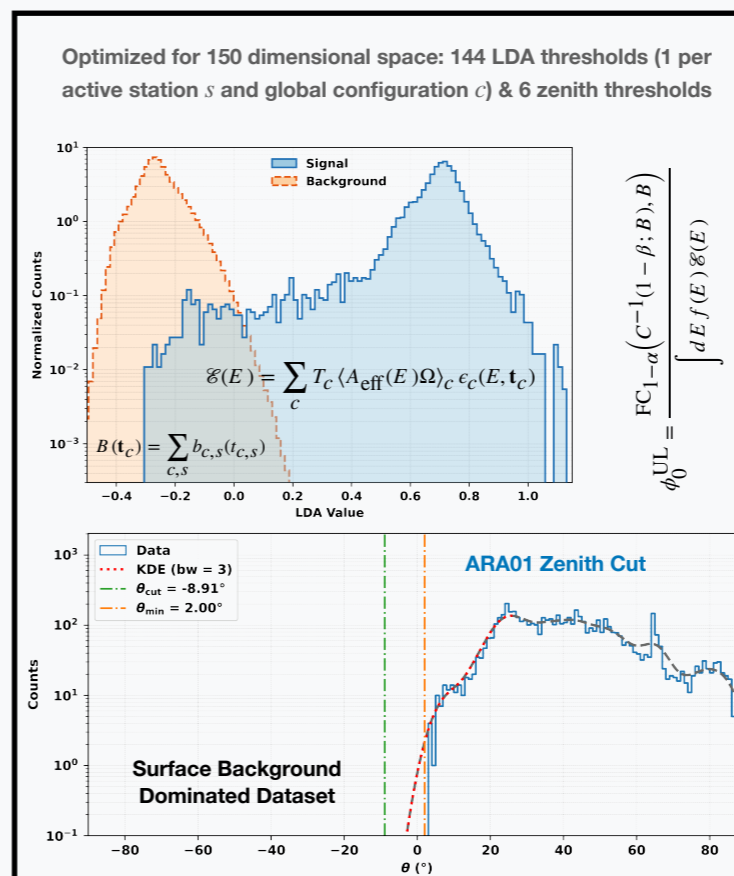
| Parameter | Value / Description |
|-------------------|--|
| Stations | 5 (A1–A5), deployed 2012–2018 |
| Station spacing | ~1.6 km (average), grid layout |
| Deployment depth | 80 (A1)–200 (A2–A5) m (in-ice antennas) |
| RX per station | 16 total (deep): 8 VPol, 8 HPol |
| TX per station | 4 total (deep): 2 VPol, 2 HPol |
| Surface antennas | 4 (A1–A3), none in A4, A5 |
| Bandwidth | 150–850 MHz, bandpass + notch filters |
| Antenna types | Birdcage (VPol), Quadslot (HPol) |
| Amplification | ~75 dB total gain (LNA + secondary) |
| Digitizer | IRS2, 3.2 GS/s (Switched Capacitor Array) |
| Triggering scheme | 3-of-8 (VPol or HPol), Phased array (PA in A5) |
| Clock/timing | GPS-synched rubidium oscillator |
| Ice temperature | -40°C to -50°C |
| DAQ readout | Local storage to IceCube Lab to North |
| Trigger rate | RF: 5–10 Hz, Calpulser: 1 Hz, Software: 1 Hz |



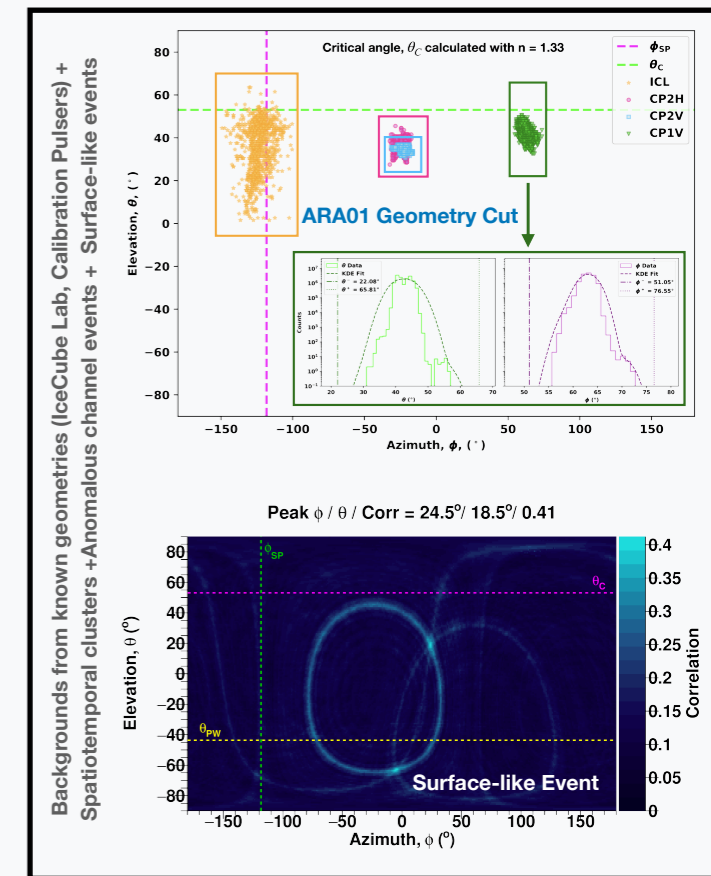
Sensitivity & Background



Thermal & Surface Cuts Optimization



Non-Thermal Cuts



Unblinding Result: No Neutrino Candidate Found!

We implement a time isolation to passing events: $\Delta t_{\text{event}} > 5.8$ hr, and 1 event survived in the ARA05 phased array. The event, recorded on April 4, 2018 at 6:01:17 AM UTC, is impulsive (average $\text{SNR}_{\text{VPol}} = 12.5, \text{SNR}_{\text{HPol}} = 11.8$) and upgoing, reconstructing near -35° elevation. A simultaneous ARA05 signal showed anomalously large traces in nearby channels. The joint ARA05+PA reconstruction favored a local spark-like discharge, not a neutrino-like far-field event.

