Abstract: Antarctic Impulsive Transient Antenna (ANITA) Instrumentation

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We will report on the details of the ANITA instrument. This instrument is fundamentally a broadband antenna, which is arrayed and constructed in such a way as to be optimized for the detection and characterization of high-energy neutrino cascades [1]. The requirement to maximize the detector view of the Antarctic ice fields implies low gain antennas yet the need for maximum sensitivity dictates using the highest gain possible. Fortunately, the Cherenkov signal increases quadratically at higher frequencies suggesting that the optimal selection is an antenna with constant gain as a function of frequency. The baseline design will be a linearly polarized log-periodic zigzag (LPZZ) antenna.

The antenna array geometry will be three separate LPZZ antenna clusters. Two horizon-view clusters consisting of two azimuthally offset rings of 8 antennas and a cluster of four antennas completing the coverage of the nadir. The dual linear polarization from each of the antennas will be converted to dual circular polarization then fed to a low noise amplifier. The signals are then split, downconverted, and sampled by the ADC. The digital signals are then brought into the trigger logic unit. Events with coincidence then have the digitized IF channels stored and submitted to the telemetry unit.

The balloon gondola will be an anti-rotation stabilized, sunpointing platform. The gondola plus science payload will weigh about 1730 Kg with a power requirement of 950 W. Power for this long-duration (9-12 days) mission will be supplied by solar photovoltaic panels.

[1] G. A. Askaryan, JETP 14, 441 (1962).