

# Radio Observations from the Eye of Quebec

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Low-frequency observations of the radio sky have the potential to open a new window on the history of the universe: measurements at  $\sim 30$  MHz and below can shed first light on the cosmic "dark ages," a period that is unexplored to date. The dark ages began about 400,000 years after the Big Bang, when the universe cooled sufficiently for neutral hydrogen to form for the first time, and lasted for about 100 million years until the first stars began to ignite. Without any stars to guide us in this period of darkness, our observations must rely solely upon redshifted 21-cm emission from the hydrogen that pervaded the universe during these early times.

Measurements of the dark ages correspond to observational frequencies of  $<30$  MHz. Observations at these frequencies are exceptionally challenging because of contamination from human-generated radio-frequency interference (RFI) and the Earth's ionosphere. Prof. H. Cynthia Chiang is leading the Array of Long Baseline Antennas to Take Radio Observations from the Sub-Antarctic/Seventy-ninth parallel (ALBATROS), a new experiment that aims to provide improved maps of the low-frequency radio sky as a first step toward future observations of the dark ages.

ALBATROS will consist of antenna stations that observe in concert as an array. Each station will operate autonomously, thus allowing the array to span large distances ( $>10$  km) to image the sky in sharp focus. ALBATROS stations will be installed at two exceptionally radio-quiet

locations where Chiang's group has pioneered the first long-term radio astronomy programs: the McGill Arctic Research Station (MARS) on Axel Heiberg Island, Nunavut, and Marion Island in the sub-Antarctic. Because COVID-19 travel restrictions prevented access to these locations during 2020-2021, Chiang and her group began testing ALBATROS instrumentation at Uapishka Station, a radio-quiet site near the "Eye of Quebec." During July-August 2021, Chiang's team installed ALBATROS instrumentation at Uapishka and successfully demonstrated autonomous operation for the first time. With this milestone completed (and relaxed COVID-19 restrictions), the team is ready to continue ALBATROS build-out at MARS and Marion in the coming year. We gratefully acknowledge use of the traditional lands of the Pessamit Innu Band Tshinashkumitinan!



## Why is this important?

One of the final frontiers in understanding the history of our universe is the cosmic "dark ages." With novel instrumentation and carefully chosen observing sites, we are taking the first steps toward understanding this early period of the universe's existence.