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THE NEXT GENERATION ARECIBO TELESCOPE - A POWERFUL CONCEPT FOR
ASTRONOMICAL DISCOVERY, SPACE SCIENCES AND PLANETARY DEFENSE.

Abstract

The Arecibo Observatory (AO) hosted the most powerful radar system and the most sensitive radio telescope in the world until the unexpected collapse of the 1000-ft “legacy” AO telescope (LAT) on December 1, 2020.

For 57 years, the facility uniquely excelled in three separate, major scientific areas: planetary science, space and atmospheric science, and astronomy. Through its final day of operation, the LAT continued to produce new, groundbreaking science, adding to its long history of extraordinary achievements, including work resulting in a Nobel Prize in Physics. The telescope’s collapse left a significant void, with dozens of high priority research projects impacted, and hundreds of researchers scrambling to find new telescopes to support their projects.

Discussions are now underway on a Next Generation Arecibo Telescope (NGAT), a novel instrument that would provide unparalleled range, resolution sensitivity and power, pushing forward the boundaries of the planetary, atmospheric, and radio astronomical sciences for decades to come. The concept, which was developed by the AO staff and broader user community, consists of an array of dishes ‘tightly’ packed on a plane to maximize the surface brightness sensitivity. The NGAT will dwarf the capabilities of the LAT, and most other telescopes currently being planned. NGAT will have more than 2 times the sky coverage, field of view, frequency range and sensitivity to receive radio signals when compared to the LAT 305m telescope. It will feature the most powerful atmospheric radar and planetary radar ever built, with 4 times the transmitting power of the LAT, and will also serve as a crucial support instrument for current and future space missions.

This lecture will provide an overview of the concept, and its potential contributions in the fields of astronomy, space and atmospheric science and planetary defense. The scientific and cultural reasons for building a new telescope, and the technical developments that have taken place to date. The prospects for securing the necessary support to move the project forward will also be discussed.