

Evolving Antennas for Ultra-High Energy Neutrino Detection

Executive Summary

This contribution discusses advances to a genetic algorithm (GA) that is evolving antenna designs more optimized for ultra-high energy neutrino detection than current detectors.

This project is unique in that the measure of fitness the GA uses to evolve antennas is based solely on the science outcome of neutrino sensitivity. The project lies at an interesting cross section of experimental physics and machine learning. The GA also requires the complex integration of various simulation software.

We have produced a GA that has evolved a population of 50 asymmetric bicone antennas over 15 generations, showing an increase in fitness. The best antennas will be manufactured and tested in late 2021. We have also created an algorithm that successfully evolves the gain pattern of antennas to inform the maximum sensitivity possible.