Optimization of the optical array geometry for IceCube-Gen2

Executive summary

ABOUT

- IceCube-Gen2 is a planned extension of the IceCube Neutrino Observatory.
- How to place high-energy optical array strings to ensure best point source sensitivity?

RELEVANCE

- “Sunflower”-like geometry is advantageous compared to regular IceCube grid.
- The best value for the inter-string spacing has never been studied before.

WHAT WAS DONE

- Generated 8 “Sunflower” geometries with spacing parameters varying from 150 m to 350 m.
- Simulated and ~50,000 triggered events for each geometry.
- Completed analysis based on parameterized detector response.
- Calculated discovery potentials for 10 years and 300 seconds exposure for each geometry.

RESULTS

- Discovery potentials differ only slightly (especially at the horizon).
- Spacings between 200 m and 280 m show good performance for both event selections because of their large muon effective area and good angular resolution.