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## **Mitigating Icing Effects with Improved LPDA Antennas in Antarctica's High-Altitude Environment for TAROGE-M**

Log-Periodic Dipole Array (LPDA) antennas are widely used in radio detection experiments for ultra-high-energy (UHE) extensive air showers (EAS), such as TAROGE-M and ARIANNA-HCR in Antarctica, due to their simple design, high gain across a broad frequency band, and strong wind resistance. However, icing on the antenna alters its response, introducing systematic effects that degrade detector performance. To mitigate this issue, we have developed a new LPDA design that minimizes icing by incorporating a dielectric material between the antenna booms—a critical structural component that influences impedance. We selected Teflon, with a permittivity of approximately 2.1, as the dielectric material, which not only prevents icing but also reduces the antenna's size, enhances mechanical stiffness, and simplifies transportation and installation. This paper presents the design, simulation, fabrication, and deployment of the improved LPDA antennas in the TAROGE-M array at the summit of Mount Melbourne, Antarctica, during the 2024–2025 Antarctic summer season.

### **Collaboration(s)**

TAROGE-M collaboration

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