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## Planar Self-Similar Antennas for Broadband Millimeter-Wave Measurements

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From extremely broadband functionality to easily scalable designs, self-similar antennas offer a strong set of benefits. With a four-arm layout, self-similar designs also become geometrically suited for dual-polarization through excitations of opposing arms. However, there has only been limited use of these devices for millimeter-wave detectors. One field for such antennas is the Cosmic Microwave Background (CMB), which encompasses a wide frequency range and is now actively focusing more on polarization measurements.

We look at multiple planar self-similar antenna designs with simulations in HFSS (High Frequency Structure Simulator) and ongoing physical testing. They all exhibit broadband operation between 130-230 GHz and can couple to both linear polarizations through the previously mentioned four-arm symmetry. Simulations include each antenna design coupled to an extended, AR-coated lenslet. From these, a basic bowtie-like arm design produced high polarization efficiency and small frequency variation with moderate efficiency, while a hybrid trapezoidal design provides high efficiency with small polarization fluctuations. Current fabricated versions of each are being tested, coupled to multichroic Kinetic Inductance Detectors (mKIDs). These planar self-similar antennas, when implemented in CMB and other detectors, could improve observations while simultaneously simplifying fabrication and detector layout designs.

### Less than 5 years of experience since completion of Ph.D

N

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