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Development of Next Generation Antenna-Coupled Hemispherical Lens Arrays for The Simons Observatory

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The Simons Observatory (SO) is a next generation Cosmic Microwave Background (CMB) experiment in the Atacama Desert of Chile that will measure both temperature and polarization at frequencies ranging from 27 - 270 GHz. SO will deploy 60,000 transition edge sensor bolometers across 49 multi-chroic detector arrays. Housed in both large-aperture (6 m) and small-aperture (0.5 m) telescopes, these detector arrays will be coupled to either feedhorn antenna arrays, or hemispherical-lenslet-coupled sinuous antennas. With this dramatic increase in detector count from previous experiments, scalable production methods for the first optical element of the array (lenslet or horn) must be developed. We report on the development of lenslet array fabrication techniques, including the implementation of epoxy-based anti-reflection coating. We will describe the simulations and optical tests of monolithically machined, silicon lenslet array designs with machined, epoxy anti-reflection coatings, and full-array, molded, epoxy anti-reflection coatings for multi-piece array designs.

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

Y

Student (Ph.D., M.Sc. or B.Sc.)

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